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ESSAYS FOR STUDENTS.

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TO

THE STUDENTS

OF THE

MIDDLESEX HOSPITAL

PREFACE.

THESE essays were written for students only, to illustrate cases that are common in Hospital work and afterward in practice. The last of them is put together from some lectures at the Middlesex Hospital. I have tried to bring out the personal side of the cases, to let the patients, as it were, speak for themselves ; and I hope that students who have made good use of those books that are complete and necessary may yet care to read something that is neither the one nor the other. I have put no diagrams or pictures in the last essay, because every student ought to see the things themselves in the aural out-patient department of his Hospital.

70, HARLEY STREET.
November, 1898.

CONTENTS.

STRANGULATED HERNIA.

THOUGH cases of strangulated hernia are very common, yet no two of them are exactly alike; and the success of the operation must ever be among the chief pleasures of surgery. These notes take for granted a knowledge of the anatomical facts of hernia, and are concerned only with some of the many aspects of cases of strangulated hernia.

The History of the Case.

In all surgery, and above all in abdominal surgery, we should study the history of each case, in the very words of the patient. Take first the 'previous history' of these cases, and what was done for the hernia in the years that preceded its strangulation; and set aside for the present all cases of umbilical or ventral hernia, and hernia in early childhood—take only inguinal and femoral hernia in adults. In some of these cases, my note-books and hospital notes say nothing about the previous history, or nothing worth saying; but it is noted in fifty cases, enough to go upon.

Eight of these fifty patients had never before seen or known that anything was amiss with them; they 'did not know that they were ruptured'; the first thing they found was that they were seized with the pains of strangulated hernia. Therefore, so far as fifty cases can prove anything, it appears that 16 per cent. of those who

have a hernia are either free from it or unconscious of it, until it becomes strangulated. Of these eight patients, four were male, four female; the men were aged 14, 18, 24, and 54; the women were aged 64, 65, 67, and 70. In two of these eight cases the hernia had been overlooked, and the patient had been treated for acute intestinal obstruction, with enemata. Of the four male patients, one was a boy 14 years old, who slipped off a pair of stilts, and came down heavily on his feet, and a right inguinal hernia immediately was found strangulated. In the four female patients, the close coincidence of their ages may be worth noting. It is hard to see how any hernia can suddenly come into existence, sac and all; and I am only quoting what these eight patients said. Anyhow, they are a good instance how we must examine for hernia in every case of acute obstruction, paying no heed to the patients' assurance that they are not ruptured.

Forty-two out of the fifty patients, or 84 per cent., had long known that they were ruptured; and some of them were good instances of the general self-neglect of the London poor. Eleven of them had never worn trusses. Seven had worn them for a time, and then had left them off. Nine were wearing trusses which did not keep the hernia from coming down. And twenty of them, probably more, had been warned again and again, by the hernia becoming tense and painful, that they were in danger of strangulation.

The eleven patients who had never worn trusses were content either to reduce the hernia from time to time, or to leave it always down. One of them said she 'had never been told to wear a truss.' Some of their notes may be put here:

1. A young man, 25 years old; strangulated right inguinal hernia, of great size; 'he has been ruptured

two years; has never worn a truss; has been in the habit of putting back the rupture every night.'

2. A boy, 16 years old; strangulated right inguinal hernia; 'he has been ruptured since birth, but has never had any trouble with it; has never worn a truss; the rupture would always go back till the day before admission, when it came down, but would not return.'

3. A man, 47 years old; strangulated right inguinal hernia; 'he has been ruptured a year; has never worn a truss; has been obliged sometimes to 'work away at his rupture' to get it back.'

4. A man, 63 years old; strangulated right inguinal hernia; he has been ruptured for years; has never worn a truss; has often got into trouble with his rupture, but has 'cured it with opening medicines.'

Of the seven patients who had worn trusses for a time, and then had left them off, one had tried a truss for twenty-four hours only, and would have no more of it; another, an old lady, had her truss at the critical moment in her pocket. The cost of trusses, the trouble of them, and the rat-trap pressure of cheap trusses bought from the chemist or borrowed of a friend, tempt poor people to go without them, or to take the first excuse for throwing them away.

The nine whose trusses were in daily use, but did not keep the hernia from coming down, are an instructive set of cases. Here are the notes of some of them:

1. A man, 32 years old, tall and muscular; strangulated right inguinal hernia; 'he has been ruptured a long time; was lifting some heavy ironstones this morning, and his rupture came down under his truss. He has had trouble with it before, but never anything like this.'

2. A man, 36 years old; strangulated right inguinal hernia; 'he has been ruptured half his life; it has given him a little trouble now and again, but nothing very serious; but eight years ago it was strangulated, and a doctor put it back. He has always worn a truss. This afternoon, while he was coughing, the hernia came down under his truss.'

3. A young man, 20 years old; strangulated right inguinal hernia; 'he has been ruptured all his life. As he was lifting a heavy weight into a cart, the hernia came down under his truss.'

4. A man, 26 years old; strangulated right femoral hernia; 'he has been ruptured about five months; he was walking quietly, and had no cough at the time, and the hernia came down under his truss.'

5. A man, 31 years old; strangulated right inguinal hernia, of enormous size; 'he says he was all right till this afternoon, when the rupture came down under his truss. Eighteen months ago he had strangulated inguinal hernia on the other side; this was relieved by operation, but the hernia relapsed.'

Among the twenty or more patients who had been warned, by attacks of increased tension or of pain, that the hernia was always in danger of strangulation, there were several who had come again and again to the very edge of disaster, or gone over the edge:

1. A woman, 45 years old; strangulated left femoral hernia; 'she has got into trouble before with her hernia—pain, even vomiting—but never so bad as now.'

2. A man, 83 years old; strangulated right inguinal hernia; 'it has been strangulated before, and relieved by operation.'

3. A woman, 64 years old; strangulated right femoral hernia; 'she has worn a truss for many years; she has got into trouble before with her hernia, but never so bad as this; it has always gone back after rest in bed.'

4. A man, 42 years old; strangulated left inguinal hernia; 'he has had a hernia for many years, and has much neglected his truss; has often suffered attacks of pain in it, and been unable to get it back; but never so bad as now.'

5. A man, 60 years old, a drunkard; strangulated right inguinal hernia, of great size; 'he has been ruptured about three years; wore a truss for a time, but left it off long ago. He has always been able to reduce the hernia, sometimes after much trouble, with hot fomentations. It has never been so large as it is now.'

6. A woman, 50 years old; strangulated left femoral

hernia; 'she has been ruptured many years; no truss. She has always been able to put the hernia back. Last week it was down for two days, but at the end of that time she got it back.'

7. A woman, 42 years old; strangulated right femoral hernia; 'she has been ruptured twenty-one years; has worn several trusses. For the last twelve months the hernia has been coming down frequently. She has on several occasions not been able to get it back, and a doctor has been called in, who has returned it. This evening, at seven o'clock, it came down, and she could not get it back. She called in a doctor, who got it back, but it came down again almost at once; and at eleven o'clock it became very painful, and she began to vomit.'

8. A woman, 53 years old; strangulated right femoral hernia; 'she has been ruptured about three years; has worn a truss, but not always. Has had trouble with her hernia more than once—pain, even vomiting—but never so bad as now. She was wearing her truss on Sunday morning, but that evening she took it off, and had a fit of coughing, and the hernia came down. She was seen by a doctor that night, and again on Monday, Tuesday, and Thursday (!), and several persistent efforts at taxis have been made.'

Of these fifty cases, only three were in private practice, so they may be taken all together as representing the experiences of hospital patients. It may be put in this way: that of every six cases of strangulated hernia five knew they were subject to hernia, and one did not know it; and three of the five had been warned again and again, by unmistakable signs, that their life was not safe.

The Onset of Strangulation.

Some of my notes give no account how the hernia became strangulated; or the patient could only say that he was seized with pain and vomiting, and 'found a swelling.' But in four cases strangulation occurred during a sudden strain; and in five it was due to coughing; and three women with strangulated femoral hernia

had 'felt it happen' while they were working in the laundry or about the house. In two cases it happened while the patient was drunk; and in two curious cases, worth quoting, it happened while the patient was in bed:

1. A woman, 70 years old; strangulated left femoral hernia, 2 inches diameter. 'She has never known that she had a hernia; she took a hot bath last night, and went to bed feeling all right; but she has been constipated lately, and has been troubled with a cough. She woke in the night with pain and vomiting, and found the swelling.'

2. A man, 61 years old; strangulated right inguinal hernia. 'He has been ruptured about three years, but has never had any trouble with it. The hernia came down, with very great pain, at 2 a.m. yesterday, while he was in bed. During the day he has vomited about eight times. He has been seen by two medical men, who tried taxis for about three-quarters of an hour, and then gave him an ounce of castor-oil' (!).

The onset of strangulation was in some cases attended by severe pain and shock; in other cases these signs were absent; and between these extremes there was every degree of suffering. One patient will be brought to hospital, with a hernia strangulated a few hours, already in a state of collapse; another will come at his leisure, after some days at home. So far as we can separate the shock of strangulated hernia from the pain of it, the severity of the shock seems to depend neither on the patient's age, nor on the size of the hernia, nor on the tightness of the stricture, but rather on the general condition and temperament of the patient; it is, I think, most marked in those Londoners who are overworked, feeble, nervous, and ill-fed:

A shoemaker, 50 years old, and looking nearer 70, feeble in mind and body; strangulated right inguinal hernia; 'he was in hospital some years ago for the same thing; his truss was broken long ago and thrown aside.' The hernia had been strangulated not more than two or

three hours, yet he was already in extreme collapse, with great pain and intense prostration and cold sweating; a feeble pulse, a dry tongue, and frequent vomiting. The hernia was at once reduced under ether, and the bowels acted on the third day; but he remained very weak and depressed for the next fortnight.

In other cases there was not the least shock; and among them were some of the most hopeless. One patient, a woman 25 years old, walked into the hospital, looking fairly well, and not complaining of any severe pain; yet the intestine was so damaged that it gave way during the operation. Another, a woman 45 years old, had gone from Tuesday to Friday, and had not sought advice. When at last she came to the hospital, she did not say that she had a hernia, and it was even thought that she might be a case of typhoid; yet the intestine was already gangrenous. Another, a woman 71 years old, was brought to the hospital just dying; she had been ill eight days, but had got about the house without much pain or vomiting, and had not sought advice till the evening before her admission; and now the tissues were so gangrenous that it was impossible to define them. In each of these cases the hernia was femoral.

The pain of strangulated hernia, so far as my cases go, is almost as variable as the shock of it. Inguinal hernia is usually more painful than femoral; and the pain is proportionate to the size of the hernia and the tightness of the stricture; thus it is generally at its worst in young and vigorous men with strong abdominal muscles. It is often felt throughout the whole lower part of the abdomen, especially about the umbilical region.

Vomiting is a more constant sign than pain or shock; yet it may not begin till the hernia has been some time strangulated; it may stop for many hours, though the work of strangulation is steadily going on; and of course

its frequency depends to some extent on the sort of treatment that the patient receives :

1. A man, 30 years old; strangulated right inguinal hernia. On the evening of admission he vomited twice; but 'the symptoms were not urgent,' and the house-surgeon was content to put an ice-bag on the swelling. There was no more vomiting till five o'clock in the afternoon of the next day, nearly twenty-four hours; he then vomited five or six ounces of bile-stained fluid soon after taking some tea; it was said that he 'just brought back the tea.' The hernia was found to be congenital; the intestine was of a deep crimson colour, and there was about half a pint of fluid in the sac. The bowels remained unmoved till the tenth day after the operation, when an enema was given.

2. A man, 72 years old; strangulated right inguinal hernia; 'he has been ruptured two and a half years; and left off his truss a few days ago. Strangulation occurred on Saturday afternoon, while he was straining to pass a motion. He went to a doctor, who reduced part of the swelling, but failed to reduce it all.' He was admitted to hospital that evening, and during the night he vomited once only. On the Sunday 'he was comfortable till 4.30 p.m., when he had very severe pain, and again vomited.' The operation was done at 9 p.m.; just as it was finished, he vomited more than half a pint of greenish watery fluid. The bowels acted on the fourth day.

3. A man, 60 years old; strangulated right inguinal hernia; has been ruptured three years, and left off his truss long ago. Strangulation occurred at ten o'clock on Saturday night, when he was drunk. He did not vomit during the night, only 'felt as if he might be sick.' Operation on Sunday morning; it was a hernia of the cæcum. He passed flatus soon after the operation, but the bowels were not moved till the seventh day, when an enema was given.

These three cases are put here only to illustrate how a patient with strangulated hernia may go a long time without vomiting. Of course, in each case a message should have been sent at once for immediate operation.

In those cases where the sac contained only omentum

or large intestine, there was less vomiting, or none. Therefore in a few cases of omental hernia I did not operate at once; it seemed better to give the patients a short rest in bed, to wait for daylight or for proper assistance. Yet we ought to call such cases strangulated, rather than incarcerated, for this word 'incarcerated' has been the death of many patients:

A woman, 71 years old; strangulated umbilical hernia, of very great size; has been ruptured forty years; has suffered many attacks of pain, even vomiting, and has never worn a proper support. Her present attack began a week before admission to hospital. She brought a letter saying that she 'had the signs simply of incarceration for a few days—that is to say, there was but little abdominal distension, she passed flatus occasionally, and some little motion came away with the enemata. The last twenty-four hours the symptoms all became accentuated.' Operation showed a mass of fœtid gangrenous omentum, and a large coil of intestine also gangrenous.

Beside the shock, the pain, and the vomiting, we must note the condition of the pulse and of the tongue, and the presence or absence of abdominal distension. But the pulse differs so widely in different cases of strangulated hernia that nothing certain can be said about it, save that it is generally rapid; it may be strong or weak, regular or intermittent, according to the age and state of the patient. The tongue also is an uncertain guide: I have seen it dry and glazed within three hours after the onset of strangulation, and moist and clean in a dying patient:

A woman, 71 years old; right femoral hernia, strangulated for two days. 'She looked frightfully bad, moribund; face grey and sweating, eyes sunken; cold and feeble. Yet her pulse was very fairly strong, and her tongue was almost normally clean and moist.' The operation was easy, and was done quickly, but she

never rallied, and died about twenty-four hours after it. The temperature was 102° a few hours after operation, and the bowels acted many times.

But we seldom find the tongue thus clean; in most cases it is dry and coated with white or brown fur, and its central portion is usually first to dry and last to clean. I have seen the tongue, in more than one case, still glazed and discoloured a fortnight after operation, though the bowels had been acting well for several days.

General abdominal distension, with inert coils of dilated intestine mapped out behind the abdominal wall, is a very bad sign; but we must 'look at the case all round.' Out of six cases where this distension was noted, four were terrible instances of peritonitis or gangrene, and one was a case of femoral hernia, two days strangulated, in a woman 71 years old; vomiting persisted for more than two days after the operation, and she was in great danger of dying; but one was a case of femoral hernia, strangulated only a few hours, in a woman 70 years old, and she had no trouble after operation. Hiccough, not the mere escape of flatus now and again from the stomach, but true spasmodic hiccough, is seldom present: it was noted in two cases only; one of them had localized peritonitis after operation, the other was a very bad case of femoral hernia three days strangulated; both of them were in danger of death for several days after operation, but recovered. But if distension, hiccough, and general abdominal tenderness be all present together, it is not likely that the patient will recover.

The feeling of an impulse in a strangulated hernia is considered by some students as a matter of great practical importance; and they ask the patient to give a cough, that they may see whether this impulse be present. The presence or the absence of it was noted in twenty-

two of my cases; of these, nine had more or less of an impulse, and thirteen had none; and it may be assumed that there was no impulse in most of those cases where nothing was said about it. To estimate the value of this sign, take the cases where its presence was duly noted:

1. A man, 72 years old; right inguinal hernia, thirty hours strangulated. 'General condition very good; a very slight impulse.' The fluid in the sac was blood-stained; the bowel was dark, claret-coloured, but not dull.

2. A man, 50 years old; left inguinal hernia of great size, four hours strangulated. 'General condition very good; has not vomited; there is a perceptible impulse.' The fluid in the sac was turbid, yellowish, two or three ounces; the bowel was large intestine, loaded with fat; it was œdematous, but of good colour and in good condition.

3. A man, 20 years old; right inguinal hernia, twelve hours strangulated. 'Severe pain, but general condition very good; marked impulse; taxis has failed, as the pain of it made him strain.' Under chloroform, the hernia went back of itself almost before it was touched.

4. A woman, 45 years old; left femoral hernia, strangulated from Friday morning to Sunday evening; taxis had failed; she had vomited several times, but the bowels were not completely obstructed. The skin over the hernia was slightly reddened, and the hernia was tender, but not hard; an impulse was felt in it. After three minutes of taxis under ether, it went back easily.

5. A boy, 16 years old; right inguinal hernia, thirty hours strangulated; pain and frequent vomiting, but general condition very good; a slight impulse on coughing. The sac contained turbid darkish-yellow fluid, two or three ounces; some omentum, deeply congested; and a small knuckle of bowel, dark purple, œdematous, slightly rough with lymph, and bruised where the stricture had been. The stricture was very tight, and a quantity of peritoneal fluid ran out after the hernia was reduced. It was a congenital hernia. The bowels were moved the day after operation.

6. A man, 26 years old; femoral hernia, strangulated

only two hours; large and hard, painful, but not tender; a slight impulse on coughing. Taxis under chloroform failed. The sac contained clear yellow fluid, two ounces; and two coils of intestine, very slightly congested. The stricture was very tight; the bowels were not moved till the eighth day after operation.

7. A man, 60 years old; right inguinal hernia of large size, twelve hours strangulated, but without vomiting; a doubtful impulse on coughing. Taxis under ether failed. The sac contained a large amount of blood-stained fluid, about six ounces, and the cæcum, which was 'hardly at all congested.' He passed flatus soon after the operation; the bowels were opened with an enema on the seventh day.

8. A man, 20 years old; right inguinal hernia, strangulated only a few hours; severe pain; an impulse was felt. Taxis had been tried for twenty minutes before admission. The sac contained about an ounce of clear yellow fluid, and a coil of intestine, deep crimson, almost black. The stricture was very tight. The bowels were opened with an enema on the eighth day.

9. A boy, 14 years old; right inguinal hernia, twenty-four hours strangulated; general condition good; slight impulse. The sac contained a quantity of serous fluid, some omentum, and a knuckle of intestine, congested and coated with lymph. It was a congenital hernia.

These nine patients all recovered, seven after operation and two without operation, and they were all of them in good general condition. Certainly, the presence of an impulse, other things being equal, justifies the surgeon in trying taxis before he operates. But it tells us nothing more; and it is no reason for rough or prolonged taxis, or for the very least delay before operation.

Finally, the onset of strangulation is in most cases attended by complete obstruction of the bowels. But here we must be on our guard against mistakes. The bowels may act once, at least, after strangulation has taken place; or the patient may be able to pass flatus, though he passes no fæcal matter; or, if the hernia be a

Littré's hernia, where only a part of the wall of the intestine is caught in the stricture—or if it be a hernia of Meckel's diverticulum, adherent in the sac, dragging on the intestine and kinking it, but not completely obstructing it—then the patient may not have any difficulty of obstruction. Among my cases were two of Littré's hernia and two of diverticular hernia, and in none of the four was there any evident obstruction of the bowels.

Also we must note what treatment these patients received before operation. Ten of them made things worse by their own fault. Of these ten, one walked about instead of going to bed; one went on with his work, and took two aperient pills; and one sent for a friend, who gave him a dose of some aperient medicine. Three of them took a similar dose on their own responsibility. Three of them, though they were urged to go at once to the hospital, stopped at home for some days. And one came into hospital, and then for many hours refused operation.

In six cases the treatment in hospital, between admission and operation, was not what it ought to be. In one of them, an enema was given to the patient as part of the routine of preparation for operation. In three, the house-surgeon did not at once notify the case, because the symptoms did not appear urgent. And in two, the house-surgeon, with more valour than discretion, punctured the sac, for some mysterious reason; happily he drew off the fluid without wounding the intestine.

In nine cases the treatment at home was at fault. In three of them, the hernia was overlooked or ignored, and the patient was treated as a case of acute internal obstruction. In two, taxis was employed for a very long time, and with a considerable amount of physical force. Two more, in addition to severe taxis, received aperient pills

or castor-oil. One received such a dose of morphia that he was comatose for eight hours and could not be roused; but the hernia went back under the morphia of its own accord. And in one case the hernia was duly reduced, but not properly bandaged, and it came down again at once and was again strangulated.

Diagnosis.

The difficulties that may attend diagnosis in cases of strangulated hernia are of two kinds: those that arise before operation, and those that arise when some unexpected condition is found during operation. Apart from strangulation, the chief difficulty lies in the likeness between hernia and hydrocele. I have seen a patient condemned for years to wear a double truss for two very large and unmistakable hydroceles, one on each side; and another who had been fitted with a 'bag-truss' for a very large encysted hydrocele of the cord. Or a man may have a hydrocele for many years, and then get a hernia above it. And, beside hydrocele, either a new growth or a mass of glands may closely imitate hernia.

After strangulation has occurred, the hernia may yet be overlooked, or may be so small and soft that it is not thought to be the cause of the patient's suffering, as in the three cases already mentioned. Otherwise a strangulated hernia can hardly be mistaken for anything else; but two of my cases were made difficult by the fact that the patient was ruptured in two places, and there was room for doubt which hernia was strangulated. And though strangulated hernia can hardly be taken for anything else, in two of my cases something else closely imitated strangulated hernia—one case of acute orchitis, and one of sudden descent of the testis about puberty, followed by strangulation of it:

1. A young man, 18 years old, was admitted to hospital on December 1, 1895, and a message was sent that it was a case of strangulated hernia (right inguinal). But he was lying on his left side, whereas patients with strangulated hernia always lie on their backs; I have only once seen the patient lying sideways, and that was an old woman with strangulated umbilical hernia. Examination showed that he had not strangulated hernia, but acute gonorrhœal orchitis, with an unusual amount of inflammatory thickening about the cord; so that the general appearance of the swelling was very like that of a strangulated hernia; and the pain of it had hindered accurate examination.

2. A boy, 16 years old, was admitted to hospital on November 27, 1893. His right testis had never come down through the canal but once, four years ago, when it was down for a short time and gave him great pain. On November 25, in the evening, while he was lifting a heavy weight, he felt the testis suddenly come down, and suffered severe pain; and next day he had vomiting. When he was admitted to hospital the vomiting had ceased, but he was in great pain and feverish; the bowels had not acted for some days; the abdominal wall was retracted and rigid. In the upper part of the right half of the scrotum there was a firm, tense, rounded, irreducible swelling, close under the skin, freely movable up and down; it felt about the size of a walnut; the skin over it was acutely inflamed. Higher up, just outside the ring, there was a second smaller swelling, that slipped away under gentle pressure, feeling like a small reducible hernia. Operation exposed first a firm rounded blood-clot in a thin envelope of loose areolar tissue; then, beneath it, a sac containing the testis, which was black and gangrenous, looking at first sight very like gangrenous intestine. The sac was continuous with the peritoneal cavity, but its neck was so narrow that it would only just admit a probe. The testis was removed, and the boy did well after operation, save that he had slight jaundice on the third day, and a little sloughing of the upper end of the wound.

But those difficulties that arise in the course of operation are yet more serious—where some condition is found that was altogether unexpected. In two cases, many

years ago, I got into great difficulty, because they were cases of hernia of Meckel's diverticulum, tightly fixed by adhesions in a very small femoral sac. In another case, the coils of intestine in the sac (left inguinal) were so densely matted together by adhesions everywhere that it was impossible to reduce the whole swelling, even after free division of the stricture; the patient got well, but a part of the hernia remained unreduced. And two cases are worth quoting here for their extreme rarity: one was a case of femoral hernia not strangulated, combined with rupture of the gall-bladder not diagnosed; the other was a case of strangulated inguinal hernia, combined with rupture of a remote coil of intestine:

1. A woman, 66 years old, was admitted to hospital on October 18, 1897, with pain, vomiting, and acute abdominal distension. We got this history only, that 'she had been ruptured many years; had never worn a truss; had often been bad like this before—even worse pain and vomiting—must have had altogether twenty such attacks.'

Her general condition was very bad: face grey and pinched, eyes sunken, tongue hard and dry with a thick brown fur; pulse feeble, about 130. The abdomen was greatly distended, with large inert coils of bowel clearly mapped out; but this distension was much more marked in the central abdominal region than at the sides, so that the abdomen had somewhat the shape of advanced pregnancy. There was tenderness toward the left of the umbilicus, but not elsewhere. In the right femoral region was a small rounded swelling, which we none of us doubted was a hernia; but it did not feel as though it were strangulated, and when she drew up her knees it seemed to disappear, and appeared again when she put them down.

Operation, done at once, exposed a small thick empty hernial sac in the femoral region; and when I opened it bright yellow fluid, staining the towels, ran out, mixed with flakes of bile-stained lymph. Evidently the gall-bladder was ruptured; and an incision over the gall-bladder let out a flood of dark-coloured bile, nearly a pint. The lower edge of the liver was exposed, and a matted

mass of omentum ; and we found a large ragged hole in the fundus of the gall-bladder, and the whole of it packed from end to end with large calculi. These I removed, and, as quickly as possible, washed out the abdominal cavity, made a counter-opening far back in the right loin, fastened the gall-bladder in the wound, and put another drainage-tube up through the sac of the femoral hernia.

This was on the 18th ; my note on the 21st says : ' If it were not for her utter exhaustion, I believe she would recover. The vomiting went on for about thirty-six or forty-eight hours after the operation, and then ceased. The tongue began to clean at once after the operation, and to-day is fairly clean and moist. The bowels acted copiously yesterday. To-day the distension is certainly less, and the dulness in the left flank has gone altogether. The temperature is normal, and the pulse is about 120, fairly good. But to-day she is almost unconscious, passing everything under her, spitting out her food, not looking worse, or so bad, as she did yesterday, but not seeming to have any hold on life.' The treatment was frequent feeding both by the mouth and by the rectum, brandy, morphia, and strychnine. She died on the 22nd. The post-mortem examination note says : ' No peritonitis, no trace of fluid in peritoneal cavity, except a few ounces of bile left in the right flank, just below the diaphragm. Here and there just one or two flakes of adherent lymph ; and a thin layer of it, easily peeled off, for two or three inches round the counter-opening in the loin. No calculi left behind ; gall-bladder firmly adherent to the wound all round.'

2. A very old man, 83 years of age, was admitted to hospital on November 23, 1893, with strangulated right inguinal hernia ; it had been strangulated for thirty-six hours, and had received no treatment. His general condition was very bad ; pulse feeble, irregular, and intermittent ; vomit copious and offensive ; general senile decay. He had for many years had a hernia, and once already it had been strangulated, and had been relieved by operation.

Ether was given at once, and taxis tried in vain. The sac contained seven or eight ounces of thin reddish-brown fluid, with one or two loose shreds of lymph, and two coils of intestine, badly strangulated, but not too bad to be put back. When I divided the stricture, a quantity of very

dark thick bloody fluid ran out of the abdominal cavity—seven or eight ounces—not fæcal in odour, not offensive; it looked like tarry blood. I reduced the hernia easily, the flow of fluid seemed stopping, and I began to close the wound; then we found on one of the sponges a small piece of soft friable brownish stuff, which had no distinct smell, but looked like a particle of fæcal matter. But with a patient 83 years old, and already dying, nothing more could be done, and he died four hours after the operation. My note on the post-mortem examination says: 'The strangulated coils were free, and there was no sign that they would not have recovered. Following the intestine upward and toward the left, at about eight or ten inches from the portion that I had reduced, came a long straight loop, the two limbs closely united by very firm adhesions, showing no mesentery at all. This long loop lay loose, pointing downward toward the pelvis. Above the distal limb of it was a transverse ragged rent across the anterior aspect of the bowel.'

This loop of intestine, all matted together by old inflammation, was doubtless in the sac at the time of the first operation, and had now given way under the strain of vomiting.

The Contents of the Sac.

Taking only inguinal and femoral hernia in adult patients, I have fairly accurate notes of 58 cases of strangulated hernia. Of these 33 were inguinal, and 25 femoral. Of the 33 inguinal, 31 were male (22 right, 9 left), and 2 were female (1 right, 1 left). Of the 25 femoral, 22 were female (16 right, 6 left), and 3 were male (2 right, 1 left).

Of these 58 cases, 6 were reduced under an anæsthetic without operation. That leaves 52 cases where the contents of the sac were exposed. In 40 of them, the sac contained small intestine only; in 3, large intestine only; in 3, omentum only; in 5, small intestine and omentum together; and in 1 the intestine was so coated with lymph that we could not tell whether it was small or

large. In 6 of the inguinal cases, the hernia was of the congenital form. Among the femoral cases were 3 examples of hernia of a part only of the wall of the intestine, and 2 examples of hernia of Meckel's diverticulum. In several of the cases, notably in four out of the six examples of congenital hernia, the swelling was of very great size. The house-surgeon's notes of one case, written vividly, but not accurately, say that the hernia was 'about the size of a man's head, only longer; several feet of gut.'

Take first the quality and quantity of the fluid in the sac, and the significance of it. Some of the notes say nothing on this subject, but in 44 cases it is noted. In 22 of them the fluid was clear and serous; in 3, turbid or slightly turbid; in 7, dark or blood-stained; in 6, more blood than serum, or even pure blood; and in 6 there was 'not a drop of fluid,' or 'hardly a drop of fluid.' In one or two only, of all these cases, was the fluid offensive. As for the quantity of it, this ranged from none to nearly half a pint; but the quantity of the fluid has not, I think, any particular significance; effusion takes place not only in the sac, but also beyond the stricture, in the peritoneal cavity; if there is room for the peritoneal fluid to pass down into the sac, there will be more fluid in the sac, and less in the peritoneal cavity; if the stricture and the constricted tissues are so accurately fitted together that the fluid cannot pass down, there will be less fluid in the sac, and more in the peritoneal cavity.

The quality of the fluid is a more important matter, and there are two questions to be considered: (1) If the character of the fluid be favourable, is it a sign that the local and general condition of the patient are also favourable? (2) If the fluid be deeply stained with blood, is it a sign of what we may call 'mal-taxis' before operation?

(1) In three cases the character of the fluid was favourable, yet the local and general conditions were most unfavourable:

1. A woman, 34 years old, was admitted to hospital on March 3, 1897, with strangulated left femoral hernia. The notes do not say how long it had been strangulated; but the fluid was 'healthy,' and the intestine was not too much damaged to be put back. But she was already dying of general peritonitis, and lived only six hours after the operation.

2. A very feeble old woman, 75 years old, was admitted to hospital on April 29, 1894, with right femoral hernia, strangulated three days. Her general condition was frightfully bad, and the skin over the hernia was acutely inflamed. Operation showed a mass of bruised, blood-stained, adherent omentum, and hidden beneath it the large intestine, gangrenous and perforated. Resection was not attempted; the intestine was opened in the wound. She died three days later of exhaustion; no peritonitis. The fluid was 'pretty healthy, yellowish, only slightly turbid; about two ounces.'

3. A man, 61 years old, was admitted to hospital on May 23, 1894, with strangulated right inguinal hernia. He had been treated with prolonged taxis and with castor-oil. His general condition was very bad; face greyish and sweating, eyes sunken; pulse very feeble; frequent hiccough; fæcal vomiting; skin over hernia inflamed. The sac contained eight or nine inches of small intestine, which was not distended, but tightly contracted, severely bruised, and rough with lymph. One of the bruises alone was nearly an inch long. The mesentery also was bruised, and one of its veins was plugged with a recent clot. The patient seemed almost dying at the time of operation, and after it he had peritonitis, and was ill for many weeks before he recovered. The fluid was 'clear, serous; about two drachms.'

Therefore the character of the fluid may be favourable or not unfavourable, even in a very bad case.

(2) The case just quoted may serve as an example of the harm that may be done by excessive taxis. A mere

tinge of blood in the fluid is no evidence of it; but if there be more than this, and especially if we find signs of bruising of the intestine or of the sac, we may be almost sure that taxis has been carried too far:

1. A woman, 53 years old, was admitted to hospital on November 11, 1897, with strangulated right femoral hernia. It had been treated at home from Sunday evening to Thursday evening (!) with repeated taxis. It felt like a mass of swollen omentum. Operation showed about half a teaspoonful of pure blood in the sac, a dense mass of omentum, and a small knuckle of intestine hidden beneath the omentum. 'The bowel was tense, greatly thickened, blackish-purple, and very badly bruised, with blood-clot here and there adherent to it.' The patient recovered.

2. A woman, 70 years old; left femoral hernia, only a few hours strangulated. Taxis had been tried in vain. There was a small hæmorrhage into the tissues outside the sac, and the fluid in the sac was pure blood, a very small quantity. The intestine was deeply congested, but not dull. The patient recovered.

Cases like these, where the sac, the mesentery, and the intestine show the mark of bruises, and the fluid in the sac is mostly blood, are strong evidence that taxis has been excessive.

The contents of the sac may be adherent; and these adhesions range from a few thin strands of soft fibrous tissue to a dense web spun all over the contents of the sac; or they may be at the neck of the sac, and nowhere else. There may be adhesions, though the patient has never worn a truss, and has never before had any trouble with his hernia. They are present in most cases of omental hernia; they may shut off one part of the sac from the rest, so that it becomes distended with fluid like a hydrocele; or the omentum, the sac, and the spermatic cord outside it may all be so densely adherent together that it is impossible to separate them. All these sorts of

adhesions, and all degrees of them, occurred among my cases. In more than one of them the adhesions caused a great deal of trouble, and the only safeguard is a free exposure of the tissues, so that we may see what we are doing.

Then comes the question: Are the contents of the sac irreparably damaged, or may they safely be put back? It is not the place here to describe the signs of hopeless injury of the intestine, or the treatment of it. But in no case where the intestine was reduced and the wound closed did the intestine afterward give way. In two of these cases the operation was followed by acute localized peritonitis; but both these patients recovered. In several of them the intestine was so badly damaged that there was some doubt whether it might safely be reduced.

There are yet two conditions, sometimes found in cases of strangulated hernia, that may be worth noting. One is œdema of the tissues overlying the sac. This may indicate gangrene of the contents of the sac, but it occurred in two cases where the intestine was not near gangrene. In both of them the hernia was inguinal, and the patient was a man advanced in age and given to drinking. The other is the deposit of lymph over the contents and the inner surface of the sac, not in loose shreds here and there, but in one smooth unbroken sheet:

A man, 47 years old, was admitted to hospital on September 9, 1897, with strangulated right inguinal hernia; taxis had been tried in vain, he had also 'worked away at it for himself.' There was a little clear fluid in the sac, and a large coil of intestine. My notes say: 'The intestine and the inside of the sac were both of them smoothly coated all over with an even, shiny layer of lymph, nowhere flocculent or granular, but everywhere of a smooth, greyish-pink surface, so like peritoneum that at one place, where there was a long fissure in the lymph, I thought I had wounded the peritoneum. The sac

was much bruised, and there was at one part of it a hæmatoma of considerable size; the intestine was stained with petechial hæmorrhages. The intestine was returned after some of the lymph, but not all, had been peeled off it; he made a good recovery.'

Strangulated Hernia in Infants.

I have operated on six cases of strangulated hernia in infancy or early childhood—all of them inguinal hernia in a male child. Three of the children were 3 months old, one 7 months, one a year, and one between 2 and 3 years. In one the hernia was of the congenital form; in four there was a distinct sac not communicating with the tunica vaginalis; in one this point could not be settled, because of the condition of the parts. And in three of them the cæcum was in the sac.

These cases raise two questions: (1) Was the operation absolutely necessary in all of them? (2) Does the same rule apply to infants as to adult patients, that we should ligature the sac and close the external ring?

1. A male child, $2\frac{1}{4}$ years old, was under my care in hospital, November, 1895, for a suppurating bruise on the forehead. At the time of admission he was wearing a bandage for left inguinal hernia; but it was taken off by the house-surgeon, as there was no swelling, and the child was always quiet, had no cough, and was in bed. One evening he was found to be in pain, with a large tense left inguinal hernia. Chloroform was given at once, and taxis was tried in vain for ten minutes. He vomited under the chloroform. I saw him two hours later; taxis failed again. The sac was a mere film of tissue; it contained a few drops of clear fluid, and a coil of congested and thickened intestine, marked with a pale dull patch at the point of stricture. The hernia was of the congenital form. The return of the bowel, after division of the stricture, was helped by holding up the child's feet. The bowels acted on the third day, and the child did well.

2. A male child, 7 months old, was admitted to hospital

on May 3, 1895, with strangulated right inguinal hernia; he had vomited five times before admission. The hernia was large, tense, without definite impulse; the skin over it was slightly œdematous. Chloroform was given, and taxis was tried in vain. Operation showed the tissues outside the sac all matted together; the sac contained a very small quantity of clear fluid, and a coil of intestine, deeply congested, rough here and there with lymph, and slightly bruised at the point of stricture. The bowels acted a few hours after operation, and for some days there was slight diarrhœa.

A fortnight after leaving the hospital, the child was brought back with strangulated inguinal hernia of the opposite side. This had been noted on May 27, and on that day it had been put back easily, again and again. On the 28th the child had been measured for a truss, which was promised for the 29th, but was not sent; and on the 30th the hernia came down larger than before, and irreducible. The child was lying on its back when this happened, and had slight diarrhœa at the time. The hernia was reduced under chloroform, and the child did well.

3. A male child, 1 year old, was admitted to hospital on January 27, 1891, with strangulated right inguinal hernia, of twenty-four hours' duration; he had vomited many times. The hernia was large and tense, and the scrotum was congested. Chloroform was given and taxis was tried in vain. The sac was a mere film of tissue, containing scarcely a drop of fluid; in it were a coil of small intestine, a fringe of omentum, and part of the cæcum. There were a few punctiform hæmorrhages on the small intestine. The bowels acted a few hours after operation. Six days afterward there was some relapse of the hernia, but it was easily reduced.

4. A male child, 3 months old, was admitted to hospital on February 14, 1894, with strangulated right inguinal hernia, of five hours' duration. It had vomited three times; the hernia was small, and not very tense. Chloroform was given, and taxis was tried in vain. The sac was very thin; it contained about 2 drachms of fluid, slightly blood-stained, and a knuckle of small intestine, which was slightly congested, and had a rough patch at one place, and was a little bruised and inclined to bleed at the point of stricture. I had some difficulty in returning the bowel, after dividing the stricture, till the child's feet

were held up; then it slipped back at once. The bowels acted that night, and for some days there was slight diarrhœa. On the seventh day the wound was dressed; it looked firmly healed from end to end; the stitches were not taken out. That evening the wound suddenly gave way, and more than a foot of intestine escaped into the dressings. The house-surgeon at once put the child under chloroform, cleansed the intestine, divided the stricture again and returned the intestine, then transfixed and tied the neck of the sac. The operation was difficult and anxious work, and the child more than once stopped breathing. Then for a few days the child was feverish, with slight diarrhœa and some distension; then the house-surgeon's stitches, like mine, failed to hold; the edges of the wound slowly curled inward, and there was slight suppuration. The child went home on March 22. It came back on May 11, with a small abscess just under the scar. On July 10 it came back again, for the hernia had begun to relapse. It was easily reduced, and a new truss was ordered.

5. A male child, 3 months old, was admitted to hospital on February 11, 1891, with strangulated right inguinal hernia, of twenty-four hours' duration. The child had vomited several times, and everything was against it, for it was brought to hospital at three o'clock on a bitterly cold morning, and it was a seven-months baby, and the thirteenth child in a poor family. Hot bath, chloroform, and taxis were tried in vain. Operation showed a very thin sac, containing about a drachm of clear fluid, and the cæcum, slightly congested, with the vermiform appendix. The stricture was divided, the child held up by the feet, and the bowel slowly went back. The bowels acted in a few hours, and the wound healed soundly; but on the fourth day the infant showed signs of acute bronchitis, and of this it died on the twelfth day.

6. A male child, 3 months old, was admitted to hospital on December 17, 1890, with strangulated right inguinal hernia. It was large and tense, and the scrotum was acutely inflamed. Chloroform was given at once, and the hernia was reduced; but the scrotum remained very thick, and the testicle and the cord were also swollen. For ten days all went well; the vomiting stopped in a few hours, the bowels acted freely, the infant took a quart of milk daily, and gained strength and put on flesh. On the

twelfth day there was fresh swelling of the scrotum; on the thirteenth the child was sick once; on the fourteenth the scrotum was tense, emphysematous, resonant on percussion, and at one place thinned and gangrenous; the prepuce was œdematous, the penis was pushed sideways, the inguinal canal was occupied by a tense cylindrical swelling. Operation showed the cæcum, already gangrenous and perforated; no sac could be made out. I laid open the bowel, and fastened it in the wound. For a month the infant did well; the cavity of the tunica vaginalis became closed by healthy granulations, the bowels acted twice a day through the wound, and there was no trouble from prolapse. Then the infant slowly lost ground, and died about six weeks after the operation.

These cases are worth noting, because they illustrate the especial characters of strangulated hernia in infants. There was no difficulty of diagnosis, but vomiting and abdominal pains are so common at this age that a strangulated hernia may be overlooked, as happened in three cases quoted in Mr. Marsh's valuable paper on this subject. There was no especial difficulty of operation, save that the sac was in most of the cases a mere film of tissue, with no fluid in it, and the tissues overlying it were ill-defined. In two cases, though the intestine had been strangulated only a short time, and was not much damaged, the scrotum was already congested. In most of the cases, the bowels acted sooner after operation than they do in adult patients, or the operation was followed by slight diarrhœa. In three of them, reduction was made easy, after division of the stricture, by holding up the child's feet, so that only his head and shoulders rested on the table.

Might not inversion, without operation, have reduced the hernia in more than one of these cases? It does often succeed; and a very young child may remain for some time, without distress, *in statu quo ante partum*. It

would have been better to have given it a trial, meantime preparing for immediate operation.

In one case, though the operation-wound looked firmly healed, and the stitches had not been taken out, the whole wound suddenly gave way a week after operation. In another case the hernia relapsed after operation. Therefore the sac should be tied, and the pillars of the ring should be brought together, in infants as in adults, unless the child's condition is so bad that it is dangerous to prolong the operation even for a few minutes; indeed, it is even more needful for children, because they are more subject to flatulence, and unable to look after themselves. But, for my excuse, some of these cases were many years ago, when the practice of tying the sac and closing the ring was not universal as it is now; and I was led wrong by the desire to get the infants off the operating-table with all possible speed, and by an idea that the smallness of the parts would ensure firm and rapid adhesion of the tissues and obliteration of the path of the hernia.

Hernia through the Abdominal Wall—Parietal Hernia.

Since there is no region of the abdominal wall that may not be the seat of hernia, either congenital or at any time of life, we must always bear in mind the possibility of hernia, in every case of obscure swelling of the abdominal wall. The following notes illustrate the general character of this form of hernia; and in one instance operation was for a time delayed, though strangulation had taken place. In these rare cases, where diagnosis may be very difficult, it is of the utmost importance that we should go very carefully into the history of the case:

1. A man, aged 59, was admitted to hospital on February 17, 1896, with a soft, rounded, ill-defined

swelling in the epigastric region. 'He says that it has been there for the last five-and-twenty years; that it came after a fall that he had, carrying a heavy load, and that it came suddenly. For some years it grew larger; then it stopped growing. It never gave him any trouble till lately; but now it is sometimes swelled after food, and then gets smaller again; and with the swelling come slight pain and nausea. There is a slight impulse on coughing; but it is hard to say whether this is due to increase in the size of the swelling, or to impulse transmitted through the abdominal wall. When the swelling is compressed, there is a very slight uncertain feeling as of partial reduction.'

Under ether the swelling could be yet further reduced. Operation showed a lobulated mass of yellow fat, and buried deep in it a sac containing omentum. The omentum was tied and cut away, the sac also, and the ring closed. He did well.

2. A woman, aged 41, was admitted to hospital on August 7, 1894. Her history was that she had been subject for four or five years to attacks of abdominal pain. At first these had come about every three weeks, but lately every week or ten days. They came suddenly, and she could not say what caused them; the pain was diffuse at the onset, afterward settling in the left iliac region, very severe, lasting several hours, relieved by hot fomentations. From the very beginning of these attacks she had found a swelling in her left side, and of late it had grown larger. She had the signs of acute intestinal obstruction; and in the left iliac region there was 'a large mass about the size of a large orange, bulging forward, movable, but not freely movable, somewhat lobular, not markedly hard, not tender, slightly dull on percussion.'

I saw her at her home the day before admission, yet did not operate till the day after admission, and for this fatal delay there is no valid excuse; but on the 7th her symptoms appeared somewhat less urgent, and we thought that the swelling was an intra-abdominal growth pressing or dragging on the intestines, and that we might, by waiting a day, obtain more favourable conditions for operation. Next day she was worse; incision in the middle line showed no general peritonitis, only slight congestion of the intestines, and two coils of intestine lying side by side, in marked contrast, one distended, the other

collapsed. These were traced to a mass of adherent intestine on the left side; and when the adhesions were broken down thin pus came welling up, and we found a coil of intestine strangulated through a tight ring in the abdominal wall. It was gently drawn backward, and was found to be 6 or 7 inches long, and gangrenous, and it gave way as soon as it had been reduced. She died the night after the operation. The post-mortem examination showed a round sharp-edged opening, about the size of a shilling, in the internal abdominal wall, about $2\frac{1}{2}$ inches above Poupart's ligament; it led into a peritoneal sac in the thickness of the abdominal wall.

3. A woman, 30 years old, came to me on account of a swelling on the right side of the abdomen. She was about the seventh month of her first pregnancy, had noted the swelling four months ago, and thought it had come from the vomiting of pregnancy, or from constipation. 'In the right abdominal wall, toward the lumbar region, there is a firm, non-elastic, rounded, irreducible swelling $1\frac{1}{2}$ or 2 inches in diameter, faintly grooved or lobular. It feels deeply fixed, neither loose in the subcutaneous tissue nor free in the abdominal cavity, but as though it were set in the thickness of the abdominal wall with a deep attachment. Neither she nor I could feel any distinct impulse in it when she coughed, nor did it become larger when she stood up; but she was sure that it did alter in size from time to time, and that it was larger and painful when she was constipated.'

I advised her to have nothing done till she was safe through her confinement, to live a very quiet life, regulate the bowels, wear a flannel bandage with an elastic pad over the swelling, and press her hand over it if at any time she had to strain. After her confinement the hernia gradually got smaller, and at last disappeared altogether.

These three cases show clearly the value of a careful history, in the patient's own words. It is a mistake to make light of the history of a case; and this mistake is especially serious in abdominal surgery.

Umbilical Hernia.

The operation for the radical cure of umbilical hernia, in favourable cases, is neither difficult nor dangerous; and the patient might well face some danger to avoid the misery and risk of a large irreducible umbilical hernia, that final condition late in life when the huge sac is thinned and ulcerated, its contents all adherent, and an old abdominal belt riding anyhow on the top of the mass; and among the poor, who cannot rest or take care of themselves, the risk is highest. In such cases, when strangulation occurs, the operation is so greatly feared that all sorts of palliative measures are tried, anything to avoid it—she has so often got into trouble before, and got well again—and so the hernia, unrelieved, becomes gangrenous:

1. A woman, about 60 years old, and very stout, was admitted to hospital on February 27, 1892, with an enormous umbilical hernia, which had been strangulated from Tuesday to Saturday, and had been treated with an ice-bag. She had been vomiting constantly all these days, and was now utterly exhausted; face pinched and sunken, breathing shallow and noisy; the mass was hard and tense everywhere, and the skin over it was gangrenous at one place. The sac contained a great quantity of omentum, brownish, sodden, bloodless, and horribly fœtid, and beneath it a gangrenous coil of intestine 5 or 6 inches long. She died during the operation.

2. A woman, 55 years old, was admitted to hospital on December 28, 1894, with a very large umbilical hernia of twenty-two years' standing; it had been strangulated for six days; the mass was very hard, and the skin over it was at one place thinned and colourless. Her condition seemed hopeless; she was in severe continual pain, face grey and pinched, pulse 100 very feeble, temperature 103°; fæcal vomiting. The sac contained masses of densely adherent fœtid omentum, and two long coils of adherent intestine greatly distended. There was hardly a drop of fluid in the sac. The upper coil was rough and blackish

at one place; the lower coil (large intestine) was gangrenous from end to end, and was nearly a foot long. Everything was so densely adherent and immovable that it was impossible to attempt resection, and I had to divide the ring very freely, and open the intestine in the wound. The pain and the vomiting stopped, but she slowly sank, and died about thirty hours after the operation.

3. An old woman, 71 years of age, was admitted to hospital on November 12, 1894, with a very large umbilical hernia of forty years' standing. She had gone through innumerable troubles with it—attacks of pain, with partial obstruction, even vomiting—and had never worn a proper support. Strangulation had begun about a week ago, but the symptoms had not appeared urgent, only what she had suffered many times before—'simple incarceration.' The bowels acted for the last time on the 6th, but she was still able for a time to pass flatus. Vomiting began on the 9th; she was not sent to hospital till mid-day on the 12th. She was feeble and in severe pain; tongue brown and dry; pulse 100 and weak; respiration shallow; the mass was of great size and very hard; the skin over it was thinned, and purplish here and there; the whole abdomen was distended, and the lower part of it, on the left side, was hard and tense. The sac contained a thick layer of gangrenous omentum, bathed in blackish fœtid fluid; and beneath the omentum lay a long coil of large intestine, also gangrenous. Even after free division of the ring above and below, it was impossible at first to draw forward the intestine, because of the dense adhesions everywhere. These I carefully divided, and freed the intestine, and cut away freely the gangrenous masses of omentum and a great quantity of sloughing skin and subcutaneous fat, and opened the intestine in the wound.

She lived for ten days after the operation, and the sloughing ceased, leaving healthy granulation-tissue; then she began to refuse her food and to be delirious at night, and became weaker and died, being 71 years old, on November 22.

Such deaths as these are sometimes laid to the charge of the hospital. The friends say, 'We took her to the hospital, and the doctor there operated on her at once, without waiting to see if she was strong enough to bear

the operation'; but the fault lies, not with him who at last operated, but with him who spent several days over treatment worse than useless. It is true that we admit in practice some brief delay before we urge operation in these cases of enormous umbilical hernia, because the operation is not free from risk, and the patient 'has often been like this before.' We are justified in trying, before operation, absolute rest in bed, enemata, abstinence from food; morphia, and taxis. But such a case must be watched almost hourly; an early limit must be set to the time of watching; the pulse, the tongue, the degree of hardness or fixation of the hernia—all must be watched; and the time of waiting must be measured, not by days, but by hours. But these three patients had been left five, six, and seven days unrelieved.

Two other cases, under more favourable conditions, recovered after operation; and one case, of 'incarceration' rather than strangulation, recovered without operation. Two cases of radical cure did well, so far as the operation was concerned; and one patient was admitted for rupture of the sac and acute bronchitis:

A woman, 50 years old, was admitted to hospital on August 18, 1894, with acute bronchitis, and a large umbilical hernia which had given way that morning. There were no symptoms of strangulation. She had been seen at home; the protruded bowel had been at once put back, and the rent in the sac had been closed with sutures. It was about an inch long, in the right lower quadrant of the sac; peristaltic movements were visible in the intestine lying beneath it. Strapping was applied so as to turn the line of sutures inward, with folds of skin drawn over them; and the wound healed, and gave no further trouble; but she died of acute bronchitis, on the fourth day after admission.

Certainly we are bound to advocate the operation for radical cure in every favourable case of umbilical hernia,

especially for hospital patients, women who are always hard at work, unable to rest or to take proper care of themselves, and always having children. And we are bound, in every case of 'incarcerated' umbilical hernia, to watch the patient from hour to hour, and to set a very close limit to the hours spent in any treatment before operation.

Operation.

In a case of strangulated inguinal or femoral hernia, the preparation for operation must include the shaving of the pubes, with especial care to cleanse and disinfect the hollow between the thigh and the external generative organs; which must be kept covered.

The best anæsthetic, for the great majority of cases, is chloroform, because the A.C.E. mixture is very slow to act, and ether is apt to cause coughing and straining. The anæsthetist must decide rather than the surgeon, but I feel sure that the balance of advantages is on the side of chloroform; and it may be combined with a hypodermic injection of strychnine, or with a stimulant given just before operation.

In inguinal and femoral hernia the incision is sometimes made too small and too low down. Transfixion, the best way of beginning, only gives you a starting-point; you must at once prolong your wound freely in both directions—downward, that you may be able to turn out of the sac, without much handling, everything that is in it; upward, that you may have the neck of the sac right under your fingers. The cause of all the trouble must be fairly exposed, not half out of sight at the upper end of the wound; you must see and feel the neck of the sac, define it well, note the level where it arises out of the surrounding structures.

Clean the sac freely, not picking or grubbing at its coverings, but slitting them straight up and down. In many cases, you cannot identify the different layers; you only know that you are going through thin films of tissue, one after another, and generally one more than you expect. If you are careful to divide them freely, keeping everything clean-cut, not digging a hole in them, then you will have no difficulty in recognising the peritoneum —the fine arborescent capillaries on its surface, the shiny yellow or pink or slate-grey colour of it, the complete absence of fluid, the fine areolar tissue between it and its innermost covering; you may see the fluid beneath it, and the outline of the contents of the sac; you make sure with a probe that you are not yet in the peritoneal cavity. If you are still in doubt, expose the tissues more freely, and your doubts will be resolved.

Open the sac very carefully, just nicking it on the point of the forceps, no more than will just admit a probe; and having opened it, slit it on a director very freely, both upward and downward, right up to the top and down to the bottom, so that you relieve tension, get close to the stricture, and are able to deal with the contents of the sac without fumbling over them; and use a rather broad director, grooved the whole way, and blunt at the end— not a probe-pointed one.

Next, examine carefully the contents of the sac, and cleanse them with irrigation. If you see nothing but omentum, look carefully to make sure that no small knuckle of intestine be hidden in or beneath it.

Division of the stricture is not always so easy as it sounds. If you have not slit the sac right up to its neck, if you are not well down on the stricture before you try to divide it, you are likely to get into trouble. First pass a probe under it, then change the probe for a hernia-

director, and make sure that the director moves freely in the abdominal cavity. Then have the intestine gently drawn downward, pass a hernia knife along the director, and hook them up against the stricture, keeping at right angles to it, and using the two instruments together as one; then with a light sawing movement nick it a quarter of an inch deep. It may fly at the first touch of the knife; but in most cases it is a little slow to yield, being dense and tough, or because you have not taken it just the right way, getting the edge of your knife against it; or there may be more than one stricture. You may have to divide the stricture at more than one point; you may have to put your knife in again after you have taken it out; anyhow, you must feel the stricture give, and the intestine become less tense, must be sure you have gone over the whole course.

After you have divided the stricture, draw the intestine downward very gently, and ascertain that it is not too much injured to be put back in the abdominal cavity. With a Littré's hernia, you cannot draw down the intestine; and with some cases of inguinal hernia, not long strangulated, you need not. But where you can do it you ought, especially in cases of femoral hernia.

Finally, be very careful to avoid all rough handling of the contents of the sac during operation. Cleanse them thoroughly with irrigation before you begin to reduce them. If they will not go back, you have not yet divided the whole stricture; admit this fact at once, and divide it again. If there be omentum and intestine together in the sac, try to put back the intestine first; otherwise, in putting back the omentum, or the stump of it after ligature, you may injure the intestine. If there be more than one coil of intestine in the sac, probably that which appears to have come down last will go back first. You

may help reduction by very gently pressing the flatus out of the intestine; by hooking upward what is left of the stricture; by raising the pelvis; by flexing and inverting the thigh. And when you have reduced the hernia, and have assured yourself that it has gone back safely, then occupy the opening with a sponge, and have pressure made over the inguinal region to prevent relapse during cough or vomiting, while you deal with the sac and with the rest of your wound. In nine cases out of ten there is no need of drainage.

As for the especial difficulties of the operation, I have had no case of deep hæmorrhage from an abnormal artery. But many times, especially in my earlier cases, I have failed to divide the stricture skilfully and at once. In three cases, the intestine had already given way before the operation, or gave way during it. In one case, many years ago, where everything was densely matted together in a general web of adhesions, so that it was impossible to define the sac, I wounded the bowel; happily the patient recovered. In two cases of femoral hernia of Meckel's diverticulum, with dense adhesions, I got into very serious trouble because I had not freely exposed everything right up into the abdominal cavity. Our only hope in such abnormal cases is to deal very freely with the tissues, to see what we are doing, and to prolong our dissection into an abdominal section, if we cannot otherwise reduce the hernia.

With umbilical hernia, all our difficulties are increased; and they reach their highest point in those cases where we have to deal with an enormous umbilical hernia, many days strangulated, gone on to gangrene, the ring almost out of reach, and everything fixed and adherent and soaked in fœtid fluid, so that it is impossible to attempt resection. You must at least see what you are

doing, lay the whole sac open, and make an artificial anus, in these worst cases, if resection is quite impracticable. And in all cases lay the sac open very freely; remember that the ring lies deeper than you would expect; and, in making your way down to it, keep close to the sac, lest you lose your way in the mass of distended intestines and ravelled omentum. When you have reached the ring, hook the tip of your finger beneath it, draw it forward, and divide it very freely; you are likely to find that a hernia knife is not so useful for this purpose as blunt-pointed scissors, or a strong probe-pointed bistouri. Probably you will find it best, in cases where it is not made impossible by adhesions, to lay open the whole sac from top to bottom; you can then more easily and more safely deal with its contents, freeing their adhesions, removing unhealthy omentum, and making your way down to the ring wherever it is most easily accessible, taking care always to stick close to the sac.

Treatment after Operation.

In all successful operations for strangulated hernia, a great part of the credit belongs to the house-surgeon and the nurse; for the patient's life may be in the balance for many days. And perhaps the after-treatment of these cases is sometimes more rigorous than it ought to be. One of my patients, a very feeble old woman, was so exhausted after operation that I ordered her to have fluid food every hour, and I believe this saved her life. Another, a habitual drunkard, got out of bed a few hours after operation, and took a good pull at the water-jug in the ward, and it did him no harm. Again, after the operation for the radical cure of hernia, the patient is sometimes kept without food as though the hernia had been strangulated, yet the intestine was not even seen at

the time of the operation. We must take each case of strangulated hernia by itself, not treat them all alike; some of them have come near the natural end of their lives, ill-fed, broken down by overwork or disease or drink, then suddenly seized by pain, vomiting, and fear of death, hurried off to the hospital, and at once subjected to the shock of the anæsthetic and the operation. These 'asthenic' cases must not be starved; and we think too much of the chance that a few spoonfuls of fluid will make them vomit. The vomiting stops of its own accord when the hernia is reduced: there is no more than what is due to the anæsthetic. Of course it does not stop in cases of reduction *en masse*, or of peritonitis, or of irremediable damage of the intestine; but it stops in all other cases a few hours after operation; I can remember only two such cases where it lasted over twelve hours. And, as a matter of fact, a few spoonfuls of milk or of brandy seldom cause vomiting. Even if they do, no harm comes of it.

But this applies only to the 'asthenic' patients. It is not a bad thing to give them a little stimulant immediately before operation. Afterward, let them have a little iced milk or brandy-and-water, two or three tablespoonfuls every two or three hours. After the first twelve hours, they may take a little more; they especially enjoy a 'drop of tea,' and it does them good. A few spoonfuls of beef-jelly or beef-tea of equal strength are not likely to do them harm. After the first four-and-twenty hours they may take fluids more freely and more frequently, and on the third day they may have such semi-solid food as egg-flip, custard, and the like, in small quantities. It is not much that we can do for them; but I think that they are sometimes too rigorously treated, and that it is especially unreasonable to keep them without stimulants.

If they do not sleep, they should have bromide, or bromide and chloral; and this draught should be given at the right hour of the evening, not somewhere about the middle of the night. Generally they do better without opium; but some of them, who have slight colic, or flatulence, or diarrhœa, are relieved by a small dose of it—especially, I think, by chlorodyne.

Your bandages may be the cause of great discomfort to them: see that the iliac crests and the fold of the groin are carefully padded, and after the first day let your patient be turned on his side for a change, not kept always on his back. You may have to draw off the urine for several days—perhaps for so long as a week. We have no means of guessing when the bowels will begin to act again. With a Littré's hernia, they may never have been obstructed at any time. If purgative medicines have been taken before operation, there may be diarrhœa after it; but mostly they are vomited. In the majority of cases the patient passes flatus for a day or two before he has a proper action of the bowels. Generally I order a simple enema to be given if the bowels have not acted on the seventh or eighth day after the operation.

In four or five of my cases there was slight hæmorrhage from the bowels; they all recovered. In one case where the wound had been closed with a continuous suture—a bad method—the suture was cut too soon, and the edges of the wound gaped a little. In a few cases of inguinal hernia of large size there was œdema of the scrotum for several days after operation. To prevent this trouble, it is best to put a T-bandage over your spica, and to teach the patient to keep the scrotum well up against the pubes, not letting it hang down; and if the hernia be very large, it is prudent to make a counter-opening, and drain the scrotum for a couple of days. In two cases hæmorrhage

took place under the wound, and in one of these I had to open the wound and turn out the clots.

In two cases severe peritonitis occurred after the operation; one of them has been mentioned, the other is worth noting here:

An old woman, 70 years old, was admitted to hospital on January 23, 1897, with strangulated right femoral hernia. 'She has been ill from Sunday to Saturday, and has been treated as a case of internal strangulation. There has been complete obstruction, with frequent fæcal vomiting; there is marked general distension, with big coils of bowel plainly mapped out.' The sac was thickened, blood-stained, and œdematous; it contained a knuckle of small intestine, dark crimson, dull, œdematous, and adherent at its convexity to the bottom of the sac. There was hardly a drop of fluid in the sac. The adhesions were gently separated and the intestine reduced. That night she had four copious fluid motions. On the third day she had abdominal pain, but no vomiting; and on the fourth day a temperature of 104°, and a large hard mass in the iliac and inguinal regions, at least 3 inches across, acutely tender. For the next ten days it was very anxious work: the temperature came down in three or four days, and kept down, and the distension was relieved with enemata; but the mass in the abdominal cavity remained for a fortnight, becoming slowly less tender, but not smaller—it even extended across the middle line. Then it began to get less hard and less definite of outline, and two deep furrows could be felt across it, as though the matted coils were recovering their shape. Her tongue remained brown and dry for many days, and her pulse about 120. With very careful watching and nursing she recovered, and left the hospital on February 27.

Of my last thirty cases of inguinal or femoral hernia, January, 1894, to September, 1898, twenty-six recovered after operation, and four died. Of these four, one was dying on admission; the intestine was already perforated,

and the sac full of fæces. One was admitted with general peritonitis, and lived only six hours after operation. And two, who were over 70 years old, died of exhaustion. But, among my earlier cases, there were several where I was at fault. These notes cover only a few of the facts of strangulated hernia; they are only to help any student who may read them to take an all-round view of these cases, as they occur in the course of his hospital work, and to see the personal side of them. The resection of gangrenous intestine, the operation for the radical cure, the further treatment of cases that remain unrelieved after the operation, he must learn elsewhere. Apart from all special difficulties, he will find his first cases of strangulated hernia, when he is in practice, difficult enough; and he must put his trust in immediate operation, free exposure of the stricture, very gentle handling of the contents of the sac, and very careful nursing after the operation.

CANCER OF THE BREAST.

THERE is always something to be made out of any series of cases illustrating a disease as we see it in practice. It is true that clinical notes on cancer are worthless in comparison with such work as Mr. Ballance and Mr. Shattock are doing; yet they may be useful so far as they go. Out of 67 cases of scirrhous cancer of the breast in women (40 in private, 27 in hospital), the disease was on the right side in 33, and on the left side in 34—a division curiously exact. Of these 67 patients, 37 were married or widowed, 22 were single, and of 8 the notes do not say which they were. Their ages were as follows, but the list is partly guesswork:

Between	30	and	40	-	-	9
,,	40	,,	50	-	-	19
,,	50	,,	60	-	-	19
,,	60	,,	70	-	-	15
,,	70	,,	80	-	-	5

In 53 cases I operated for the primary disease, and again in 9 of these for recurrence. In 3 cases the primary disease had already been removed, and I operated for recurrence; and in 11 cases either the disease was past operation or another surgeon operated.

Out of all these patients, only 3 or 4 sought advice at once, so soon as they found a swelling in the breast. Two waited a month, 8 waited between one and three months, 7 between three and six months, and 10

between six months and a year. Eight went for more than a year, 4 for two or three years, 5 for three or four, 1 for five, 2 for six, and 1 for ten. If any man will write out these figures, he will see the full horror of them. Here is a disease so common that we have all lost friends or relatives by it: women know all about it, and live in fear of it, and frequently examine their breasts to be sure they are healthy; and then, when they find it, they do nothing. It is impossible to overweight the importance of this fact; and anybody who can make light of a breast case is wholly unfit for practice.

When the patient does at last show her breast to a surgeon, and he asks her why she did not come before, she may answer that she did not think it was anything serious, because it was not painful; and this may be said either in good faith or because she dared not face the operation. Some friend may have told her that it impairs the use of the arm, or that it is no advantage, because the disease is 'constitutional.' Anyhow, it seems to many women a hateful mutilation—a sort of loss of sex—so they let the growth go on, some of them for years.

In three cases there was a clear history of cancer of the breast in the family. Six patients attributed the growth to injury: one of them said that her doctor had bruised the breast with his stethoscope, and nothing would persuade her that he had not set up cancer there. Two of these six patients gave a very definite account of injury: one of them had been struck on the upper part of the left breast, and had said at once, 'If ever I have cancer, I shall have it there'; and in that very place she did have it: the other had suffered fracture of the neck of the right humerus, with severe bruising of the soft tissues, and cancer came just in that part of the right breast which had been most bruised. In several cases it was

pain that first called the patient's attention to her breast, or she felt discomfort from the pressure of her clothes. One patient, having some trivial inflammation of her finger, with pain in the axilla, was led to examine her breast, and found a swelling in it; and two patients, having fallen, felt pain in their breasts, and found the disease there. In one case there was chronic inflammation of the areola; in two the opposite breast had already been removed for cancer; in a few cases of duct cancer the discharge from the nipple was the first thing noticed; and one patient, with extensive disease, was positive that it had 'come quite suddenly.' Or the disease may be discovered during habitual examination of the breasts, made in constant fear that something will be found there.

And because women thus live afraid of cancer of the breast, false alarms are very common. I have seen four cases where the lower costal cartilages on the left side, being unduly prominent, were mistaken for some sort of growth in the breast. Or pain may be felt in a healthy breast—either true neuralgia, or more often the extreme sensitiveness of a nervous imaginative woman; for instance, this pain came in the breast of a girl whose mother was at the time under my care for cancer of the breast. Or take the following case:

Miss H., 35; thin, pale, nervous. Four years ago, a blow on the left breast. Pain began about a year ago; it is referred mostly to the upper and inner part of the breast, but sometimes it is more diffuse. It never wakes her at night, and she says that it becomes worse if she pays attention to it. She has had all sorts of treatment, including homœopathy; and works hard, and does not take exercise. The left breast is a little fuller than the right, and the ribs rather more prominent.

Again, any slight injury to the breast may excite fear of cancer. And, of course, after removal of one breast for

cancer, it is always in the patient's thoughts that the other breast will also be attacked; she feels the same kind of pain in it, and asks that it may be examined, because she is sure there is something wrong with it. This fear of cancer of the breast is everywhere; and it may be easy to remove the disease, yet impossible to set the patient's mind at rest.

Diagnosis.

Cancer of the breast is at first absolutely painless, and that is one of its worst features. Even in our profession the belief still exists here and there that a painless nodule in the breast is not likely to be cancer: for example, one of my patients had been told that her case was not serious; she was to come back if the swelling got painful. In other cases the disease had been diagnosed as an innocent growth, or as periostitis of a costal cartilage, or as gouty inflammation of the breast; or it had been 'watched' for some months, or treated with lotions; and one patient had been told that it was nothing serious, yet the breast had not been exposed, only felt through her clothes. To come to my own faults, I have often removed a breast without first cutting into the disease to make sure it was cancer. No harm has been done by my neglect; but it is the duty of the surgeon in every operation—no matter how certain he may feel—to incise the growth before he goes further; and he must use a separate knife for this purpose, lest he infect the edges of his operation-wound. Even after incision the diagnosis was still doubtful in one or two of my cases; but in all the rest it was impossible to mistake the tough creaking or grating feel of the growth, the vagueness of its outline, the cupped grey bloodless look of its cut surface. This free exploratory incision is of the utmost importance, for

there are few diseases of the breast that may not be mistaken for cancer, or cancer for them.

1. **Acute Inflammation.**—In certain rare cases cancer of the breast is so rapid that in a few months, even a few weeks, the whole breast is a tense globular mass of disease, the nipple flattened out, the veins dilated, and the skin everywhere adherent and congested. This acute cancer was called 'carcinoma gravidarum' by old writers, because it is apt to attack young women during pregnancy or nursing; and I have seen more than one case where it had been mistaken for acute general inflammation. But in acute cancer the breast is heavy, solid, and resistent over its whole surface; there is no fluctuation anywhere, no soft spot, and one part is not more tender than another; the entire mass is rigid, the skin bound down all over it. The glands are soon infected, and the disease is likely to recur rapidly after operation.

2. **Chronic Lobar Induration.**—It is hard to understand the exact meaning of such terms as chronic mastitis, lobular hypertrophy, and simple induration of the breast; and it is probable that they cover many different diseases. On the one hand there is ordinary chronic inflammation of a lobe of the breast, what women call a 'cold in the breast'; on the other hand there is cancer of slow growth. Between these extremes there comes a small ill-defined group of cases, where some portion of the breast remains for years thick and hard, neither returning to health nor drifting into cancer. But these cases were rare even in the days when operations were not common. Probably some of them were syphilitic, and some were a very slow form of cancer, or what may be called the pre-cancerous stage of the disease; but, though we must admit the existence of these intermediate cases, yet there is no sure way of recognising them, and no safety in

refusing to operate. The common 'chronic mastitis' is cured in a few weeks with rest, belladonna ointment, iodide of potassium, and so forth; and if a doubtful induration in the breast does not yield to treatment in a month or six weeks, then we ought to operate. The following cases are of interest here. In the first there was 'chronic mastitis' on one side, and cancer on the other; in the second there was cancer for ten years, and then sudden infection of the glands:

1. Mrs. F., 32; she had an abscess in the right breast after her first confinement, and has never nursed with that breast. In both breasts there is a swelling; in the right breast, immediately above the nipple, there is an ill-defined hard lump, but it does not feel hard enough for cancer, and becomes less evident when the whole breast is gently compressed against the pectoral muscle. In the left breast, outside and below the nipple, there is a flattish nodular lump, somewhat wedge-shaped, and feeling very like an indurated lobe of the breast; it has not the full hardness of cancer, the skin does not seem to be adherent over it, the nipple is not retracted; there is a slight fulness just perceptible in the axilla.

The two breasts were so nearly alike that the operation was put off for ten days. By that time the induration in the right breast was almost gone; but the disease in the left breast had become larger, closer under the fingers, more nodular, and evidently cancer.

2. Miss J., 50; for ten years she has had a hard lump in the right breast. It occupies the central part of the breast, for about an inch all round the nipple, and feels tough and ill-defined; the nipple is deeply retracted. Now, after all these years, a swelling has come in the mid-axillary line, and is growing fast. No enlarged glands are felt either at the summit of the axilla or above the clavicle.

Operation (May 28, 1888) showed a tough, dry, shrunken growth, with one or two small cysts in it, which were full of a turbid fluid loaded with cholesterin. The disease in the mid-axillary line was due to gland infection, evidently of recent date. The axilla was opened, but no

glands were found in it. (She had recurrent disease in the axilla, May, 1891.)

Therefore we ought to urge operation, unless there be some special reason against it, in every case of chronic induration in the breast that does not yield to treatment; and it is probable that many of these intermediate cases of 'simple induration' are simply cancer all the time.

3. **Chronic Abscess.**—Here the danger lies in the opposite direction, not of saving a breast that ought to be removed, but of removing a breast that ought to be saved. With chronic abscess of the breast the skin is adherent, and the nipple may be retracted; and the age of the patient, the history of the case, and the feel of the swelling, may all of them be in favour of cancer:

1. Mrs. A., 50; looks delicate, and has the scar of an old abscess on the left side of her neck. For two months she has noted a swelling in her left breast. In the upper part of the breast, immediately above the nipple, there is an ill-defined lump, neither painful nor tender. At one point it has a distinct nodular prominence on it. The skin is slightly adherent over it, and the nipple is deeply retracted, but not pulled sideways. This retraction of the nipple came after the disease in the breast.

She was admitted to hospital, but operation was delayed. A week after her admission the swelling became painful, soft, and smooth; the skin over it became hot, red, and œdematous, and the nipple came forward again. Exploratory incision showed that the disease was a chronic abscess, with very thick walls, containing thick blood-stained pus.

2. Mrs. C., 45; thin and pale. Her father and her three sisters have all died of consumption, and two of her brothers have suffered from it. Seventeen years ago, after her last confinement, she had an abscess in the upper inner part of the left breast, and she has had occasional pain and swelling here since that time. There is now a tender, ill-defined lump immediately beneath the scar. Incision showed that it was a chronic abscess.

3. Mrs. B., 35. She has had four abscesses at different

times in her right breast; the last was a year ago. Her youngest child is many years old. She has never been able to nurse with this breast, because the nipple has been inverted and buried for years. In the upper inner part of the right breast there is an ill-defined lump, hard, but not so hard as cancer. The skin is adherent over it. She could not come into hospital at once, and the abscess broke before she was admitted.

4. Mrs. P., 71. For several months she has noted a swelling in the outer part of the right breast. For the last fortnight there has been an offensive discharge from the nipple. The swelling is hard and tense; the axillary glands are not enlarged.

I removed the lump freely, with the tissues immediately round it, fearing from her age that it was cancer. I neglected to make an exploratory incision. There was no evidence of cancer, only a small abscess with very thick walls. Happily, I did not remove the breast.

These four cases, taken together, are good examples how closely chronic abscess may imitate cancer of the breast, in the age of the patient, the feel of the swelling, the adhesion of the skin, and the retraction of the nipple; and they show clearly the absolute necessity of exploratory incision in all cases.

4. **New Growths other than Cancer.**—There are many cases where it is impossible to say whether a growth in the breast is a cyst or an adenoma or a sarcoma, yet we tell the patient that, anyhow, we do not think it is cancer. The disease in these cases is a small smooth nodule, slipping freely in the substance of the breast; it has no distinctive character—it may be anything—but we find no signs of cancer in the skin over it, or in the nipple, or in the axillary glands. But these signs are not constant; and a nodule in the breast may be cancer, though the weight of evidence be against it. Therefore the surgeon, like the patient, must have the fear of cancer always before him, must look at the case all round, and not

hesitate to advise that an exploratory incision should be made.

If it were possible in practice, it would be a good plan to reverse the usual order of examination of a breast case, and begin with careful general examination of the patient, especially over the liver and toward the umbilicus; then to examine both supraclavicular regions, for we never forget to feel the axillæ, but we do sometimes forget to feel above the clavicles; then the axillæ, the side of the chest, and last of all the breast. By this method, we should avoid the risk of inflicting on any woman the misery of a useless operation:

Mrs. H., 41; admitted to hospital, January 21, 1898, with cancer of the left breast. She attributes it to frequent blows on the breast, and has known of it for eighteen months; but says she did not think it was anything serious, because it was not painful. It occupies the lower inner part of the breast; skin adherent; nipple retracted; axillary glands enlarged; an ill-defined fulness below the clavicle, and slight enlargement of the glands above both clavicles. The arm is not swollen, nor are its veins dilated. Her face has a slight yellowish tinge. The liver is not felt below the ribs; but just above the umbilicus there are one or two small nodules, clearly defined, movable, rising and falling with respiration. She was advised to have nothing done; but we heard a few weeks later that she had gone elsewhere, had been submitted to operation without examination of the abdomen, and was now dying 'with cancer all over her.'

Anyhow, in all advanced cases of cancer of the breast, we must find some pretext for making a careful examination of the abdomen. But in practice we must follow the course of the disease, and begin with the breast, lest we terrify the patient. She must sit facing the light, and both breasts must be exposed and examined, and the whole front of the chest, and both supraclavicular regions. If the surgeon stands behind the patient, and puts his

hands down over her shoulders, there is this advantage, that she does not see his face; but if he sits in front of her, he is better able to make a thorough examination. And having examined the growth, and noted its general character, he looks next for the three great signs of cancer—adhesion of the skin, retraction of the nipple, and infection of the glands. In about one-third of my cases all these signs were present. In about one-fifth, the skin was adherent and the glands were infected; but there is nothing said in the notes about the nipple, or it is especially noted that the nipple was not retracted. And in several cases the skin, the nipple, and the glands all appeared healthy.

Of these three signs of cancer, adhesion of the skin is the most constant; it may be well marked even in cases where the disease is no more than a small loose nodule, slipping freely in the breast; it may be, as it were, the most striking feature of the case:

Mrs. F., 55; has noted the disease in her breast eighteen months; her attention was called to it by a sort of dragging feel about the breast, and by her dress being uncomfortable over it. At the extreme margin of the lower inner part of the left breast there is a furrow in the skin, about an inch long, very deeply indrawn, hard, and excoriated. The nipple is inverted and obliterated, but so it has been ever since she last nursed with it, seventeen years ago. There is an ill-defined mass of axillary glands. It seemed at first as though the disease were limited to the skin; but more careful examination showed a hard swelling in the breast, continuous with the diseased skin. Operation, June 22, 1896; free removal; a gland was found midway between the breast and the axilla, not felt before operation. (She remains free from recurrence, May, 1898.)

Yet it is easy to overlook this sign of the disease, for there may be no puckering or thickening of the skin, only a very slight difficulty in raising a fold of it off the breast;

it seems to stick a little, to be slow to come free; or a slight indrawing of it may be visible when the patient bends forward, so that the breast is unsupported. And in two or three of my cases, though the disease was extensive, yet the skin was nowhere adherent. Again, it is not adherent in most cases of duct cancer; and in most cases of chronic abscess it is adherent. And though the disease be cancer, yet the adhesion may be diminished by fomentation of the breast:

Miss E., 36; her grandmother had cancer of the breast. In the outer part of the left breast there is a small round sharply-defined nodule, very freely movable in the breast; she has known of it for a few days only; no glands are felt in the axilla. A note written immediately after operation says, 'The skin over the nodule was much less adherent to-day, after twenty-four hours' dressing with carbolic lotion. Yesterday, I was especially struck by its adhesion; the skin stuck all over the little lump, and would not go into creases; to-day it was almost impossible to detect the least sticking. The nipple was ever so little drawn toward the lump, obliquely. The nodule slipped so freely in the breast that I could hardly steady it to cut into it.' Operation, December 29, 1889; the whole breast was removed, but the axilla was not opened. The microscopical report was, 'Typical scirrhus, rapidly growing.' (She remains free from recurrence, May, 1898.)

In the following case there was a very curious condition of the skin over the disease; it was probably due to cicatricial changes in the breast after suppuration, years before it became the seat of cancer:

Mrs. S., 57; six months ago she noted a hard lump in the right breast. For years she has had trouble with this breast—sore nipple and abscesses—but she has managed to nurse all her eleven children with it. She says that the breast has never felt comfortable; it has always felt as if there were a lump in it, which got worse whenever she caught cold. She has never been able to nurse with

the opposite breast, as the nipple would never come forward.

The whole upper part of the right breast is occupied by a large, tough, ill-defined nodular growth; and the nipple is deeply retracted. 'A curious thing is that the skin over the growth, and for about half an inch beyond it, so far from being adherent, is strangely baggy, semi-translucent, slack, and loosely wrinkled, like the baggy lower eyelids of old people.' This condition of the skin had been noted for two or three weeks only. The nipple had been retracted for two or three months. Operation, February 18, 1895; the disease was found to be a shrunken nodule of cancer, very hard, cupping on section, yellowish and granular, lying very deep in the breast. The axilla was opened, but no glands were found in it. (She remains free from recurrence, May, 1898.)

Retraction of the nipple is such a common trouble with women that it is bound to coincide with cancer in this or that case by mere chance. But if it be more recent than the swelling in the breast, and if the nipple be retracted sideways—not drawn straight back, but pulled obliquely toward the disease—then it is almost certain that the patient has cancer. The nipple may be only retracted, or wholly inverted, or flattened out by expansion of the growth beneath it, or just tilted to one side. And in the examination of a breast case it is wrong to handle the nipple, or to employ that offensive method of drawing it forward to see if the swelling in the breast moves with it. And usually it is not retracted either in cases of duct cancer or in cases where the disease is far away from the centre of the breast.

This marginal or out-lying cancer, the growth at the extreme edge of the breast, or seeming to lie even outside it, is of especial interest, because it may so easily be mistaken for something else:

1. Mrs. B., 65; has lately noted a small swelling in the left breast, and has been told that it is 'periostitis of a

costal cartilage.' Her attention was called to it by the rubbing of her stays. At the extreme sternal margin of the breast, or even a little beyond it, there is a small nodule, so closely adherent to the cartilages that it seems a part of them, very hard, and slightly nodular; the skin over it is not markedly adherent, but very slightly dimpled or puckered; and this she pointed out herself. The nipple has been retracted for many years—'I have always had trouble with this nipple; it has always been a bother when I was nursing, but I have always managed to get it out; I don't think that it has been quite so much drawn in lately as it used to be.'

2. Mrs. C., 65; first noted the disease in her breast three or four years ago, after an attack of influenza. It has been painful at times, especially during the last few months. At the extreme margin of the upper inner part of the left breast, or even a little beyond it, there is a hard irregular nodule. That part of it which lies just within the breast is ill-defined; that part of it which seems to lie beyond the edge of the breast is clearly defined and very hard; the skin is deeply puckered, and the nodule feels adherent to the pectoral muscle; the axillary glands do not feel enlarged. Both nipples are inverted, appearing as mere slits on the breasts. Operation, August 3, 1894; the disease was found to be cancer, firmly adherent to the muscle. The growth was very freely excised, but the whole breast was not removed. (She remains free from recurrence, May, 1898.)

In both these cases, and in another like them, there was this association of simple retraction of the nipple, of many years' duration, with recent cancer at the extreme edge of the breast. Probably this was mere chance; yet it is just possible that ordinary retraction of the nipple may have some influence in deciding the site of cancer, when it does at last attack the breast.

Infection of the glands—that worst sign of cancer—is already present in many cases where we cannot feel enlarged glands before operation; yet it may be our fault that we did not find them. It is wrong to thrust our fingers high up into the axilla, feeling for glands some-

where about the head of the humerus; we must follow the disease every inch of the way, examining with great care the whole side of the chest and the under aspect of the pectoral muscle. Also we must examine both axillæ, and both supraclavicular regions: first, because simple enlargement of the axillary glands may chance to coincide with cancer of the breast, therefore we must compare one axilla with the other; next, because cancer may make its way from the breast of one side to the glands of the other side, yet the case may not be past operation:

Miss M., 35; noted a swelling in her left breast a fortnight ago, but says she has often had pain there when she has 'caught cold in it.' There is a hard swelling in the upper outer part of the breast, the skin is adherent, the axillary glands are enlarged. There is also very slight enlargement, just perceptible, of the left supraclavicular glands, and a slight feeling of fulness or resistence about the posterior muscles of the left side of the neck. Operation, December 1, 1894: free removal, including part of the pectoral muscle. In October, 1895, she had an enlarged gland in the opposite (right) supraclavicular region; this was easily shelled out. In 1896 she had distinct enlargement of the left supraclavicular glands, and a round, flattened, hard, clearly-defined growth, about an inch across, in the middle line of the back of the neck, just over the lower cervical vertebræ.

There is one place where we sometimes forget to search for an infected gland, and that is the side-wall of the chest, midway between the breast and the axilla: here the disease may stop for a time. In six cases its presence here was noted. In one of them it had been said that there was no disease of the glands; in another the tumour in the breast had been diagnosed as gout. In three of these six cases the axillary glands did not feel enlarged before operation, but in all of them the axilla was opened at the time of operation, and in five out of the six it was found to be infected. Of these six patients, one died of

acute pneumonia, a year after operation, without recurrence. One died paraplegic, a year after operation; no post-mortem examination was made. One I cannot trace. The other three were free from recurrence when I last heard of them, two years, six years, and two years after operation.

Finally, when the surgeon has carefully studied all the signs of the case, and has found clear evidence of cancer, but no clear evidence against operation, he must consider whether the growth is adherent to the pectoral muscle. In two cases a nodule which had seemed to be in the breast was found embedded deep in the substance of the muscle, and the disease recurred within a year. Once, and once only, I operated on a patient when the disease in the breast had gone past removal:

Mrs. B., 54; has noted the disease more than a year. The whole lower outer part of the left breast is occupied by a mass of cancer; the skin is adherent, the nipple retracted, the axillary glands enlarged. Operation, February 26, 1898. I recognised that the mass did not move with perfect freedom on the chest-wall, but I did not pay enough attention to the fact that though it moved yet it felt moored; when you lifted it, you seemed to drag the deep parts forward with it. Operation showed that the disease had burrowed so deep that plugs of it were thrusting apart the fibres of the intercostal muscle; and, in spite of careful cleaning of the sternum and the costal cartilages, there was more than one spot where disease was left behind. She recovered from the operation, and left the hospital. We heard a short time afterward that she had died quite suddenly without any previous sign of illness.

So long as the growth can be not only moved up and down on the muscle, and from side to side, but also rotated on it this way and that, there is no fear that it is hopelessly fixed. Some slight amount of fixation is, of course, a very common thing. The under aspect of the

growth may be nowhere exposed at the operation; there may be a layer of tissue, apparently healthy, everywhere between it and the muscle; yet the whole breast does not come away easily, it sticks here or there. Whether it does or not, we must in every case remove all the pectoral fascia, dipping the point of the knife well into the fibres of the muscle, and cleaning it like a dissection. And if the growth be firmly adherent, we must deal very freely with the muscle itself.

Operation.

In five cases a free removal of the disease was made, but the whole breast was not removed. In two of them, ten and eleven years ago, I used a caustic paste; but I would now as soon go back to the actual cautery instead of the ligature. One of these two patients cannot be traced; in the other the disease recurred in a few months. The other three cases were as follows:

1. Mrs. C., 60; has noted the disease in her breast four months. At the extreme lower margin of the left breast, or even a little beyond it, there is a hard nodule, about the size of a hazel-nut, with the skin adherent over it; toward the axilla there is an ill-defined feeling of hardness. Operation, March 1, 1892: the nodule and the induration toward the axilla were freely removed, but the whole breast was not removed. Three months later, operation for a minute recurrent growth at the sternal end of the scar; she also complained of pain about the anterior mediastinal region. This patient cannot be traced.

2. Mrs. C., 65; case already quoted (p. 60). She remains free from recurrence, May, 1898, nearly four years after operation.

3. Miss W., 38; has noted the disease in her breast four years. In the upper inner part of the right breast, a small hard nodule; and the breast elsewhere felt firmer than a healthy breast, and slightly nodular or granular;

the skin, the nipple, and the glands all seemed healthy. She was intensely anxious that some semblance of a breast should be preserved, as she was engaged to be married. Operation, January 5, 1895 : the whole breast, or almost every particle of it, was dissected out through one long curved incision, so that the nipple was retained. The wound healed well, but in less than three months there was a minute recurrent nodule just above the sternal end of the scar.

Thus, three of these five patients suffered very rapid recurrence, one cannot be traced, and one remains free from recurrence four years after operation. These are bad results, and I do not believe that good results will ever come of this sort of operation. Apart from all risk of leaving disease behind in the rest of the breast, far from the main growth, this removal of part of the breast may be just as difficult, just as severe, as the removal of the whole breast. It is like cutting the first slice out of a cake ; the sides of your elliptical incision tend to converge, you do not deal fairly with the pectoral fascia ; I have seen it take as long, and give as much trouble, as the ordinary operation. It may, perhaps, be a good treatment for some cases of early marginal cancer in a very voluminous breast ; but even in these it would be better, by altering the lines of incision, to steer wide of the disease, and remove also every portion of the breast, and the pectoral fascia. Extreme old age might be a reason for it, if the disease were small, superficial, and of slow growth ; but in very old women the breast is usually so shrunken that there is no practical difference between free removal of the disease and removal of the breast ; and they bear the loss of the breast without shock, or hæmorrhage, or distress of mind :

Mrs. A., 79 ; noted the disease a year ago, and was advised to have nothing done to it. In the fold of the

right breast, near the sternum, there is a small, flattish nodule, about three-quarters of an inch in diameter; the skin has lately become adherent. In both axillæ there are some enlarged glands, which, she says, often come when she catches cold; those on the right side may be a little larger than those on the left, but nothing certain. She is thin, vigorous, takes things easily, and her general health is good. Operation, October 21, 1896: the breast removed, and the fascia carefully cleaned away, especially in the neighbourhood of the disease. The axilla was not opened. (She remains free from recurrence, and in good health, May, 1898.)

Old age is no reason against removing the whole breast, other things being equal; there is, indeed, only one good thing to be said for leaving some part of it: the patient is more willing to submit to operation, and more content with the immediate result of it. But she is in greater danger of recurrence, and that soon.

In eleven cases, the whole breast was removed, but the axilla was not opened. Four of them cannot be traced, and one is too recent to be of any use; and one patient, whose case is given hereafter, died not long after the operation. There remain, therefore, five cases. In one of these, recurrence took place in the axilla, a year and a half after operation. One died of 'heart disease' about six years after the operation; it was done in August, 1887, and she was free from recurrence when I last saw her, in December, 1892. Three remain free from recurrence, a year and a half, nine years, and thirteen years after operation. It might be said that these results are good; but the man who said it would be easily pleased. First, half a dozen cases cannot prove anything; next, it is not the results that are good, but the cases themselves. The glands were healthy, and there is an end of the matter. And, of course, I have many times found extensive disease in the axilla, though none was felt there before

operation: and I have come to believe that the arguments in favour of a very free operation are our best guides for most cases of cancer of the breast.

The evidence for the more extensive method of operating rests on pathology, on the results obtained, and on the advantage of seeing what you are doing. Take only this last part of the evidence; so far as my experience goes, the more extensive operation is not only safe for the patient, but also easy for the surgeon. If he only shells out a few very large glands from the axilla, pulling them through a hole torn in the deep fascia, trusting to touch, not to sight, he may not do much good; but if he thinks of the axilla and its contents together, how he may best expose and remove all disease either on or in or beneath the pectoralis, then he will deal very freely with this muscle, or he cannot see what he is doing. You divide or remove more or less of the muscle, not only because it is or may be diseased, but to see clearly the disease beneath; you use the scissors, not the knife; the divided edges of the muscle go wide apart, you forcibly retract the rest of it with a very large retractor, and you get such a view of the subpectoral region as the old operation could never give; the axilla is seen in its true relation to the neighbouring tissues, the axillary vein is safely defined, and you clean away glands, fat, and fascia, without difficulty and without risk. And you gain yet more, if you follow the plan of not cutting away the breast at once, but leaving its axillary attachment to the last; turning the whole mass outward off the chest wall, making a sort of pedicle at the axilla, so that the dragging weight helps you to distinguish the infected tissues:

1. Mrs. S., 56; has noted the disease in her breast eighteen months. In the left breast, a large mass of cancer, skin very adherent, nipple inverted and buried.

An ill-defined fulness between the breast and the axilla; no definite enlargement of the axillary glands. Operation, September 6, 1897: very free removal of the breast, which was turned outward off the chest wall; about two-thirds of the pectoralis was removed, and the vein, the pectoralis minor, and the serratus were well exposed and cleaned. There was very little bleeding, and the wound came together except at the centre. She bore the operation well, and left the hospital within three weeks.

2. Mrs. McN., 52; has noted the disease for a year. In the outer upper margin of the left breast, a mass of cancer about an inch in diameter; skin adherent, nipple retracted; an ill-defined fulness in the axilla, and slight enlargement of the glands above the clavicle. Operation, September, 1897: very free removal of the breast, which was turned outward; sternal portion of the pectoralis divided, serratus carefully cleaned up to the subscapular vessels, axillary vessels very freely exposed. 'There were glands all round the vein, and I thought I should have to divide it; but I managed to peel them off the front of the vein, and then shelled out a cluster of glands running up behind it to the clavicle; and in doing this I found the vein was double. The whole area was well cleaned; the glands above the clavicle were left for the present.' Very little blood was lost, the wound came together well, and she left the hospital in a fortnight. Second operation, December 15: free incision above clavicle, deep fascia carefully opened, and two glands shelled out, the lower of them, an inch in length, lying just behind the clavicle; she left the hospital in five days.

3. Mrs. E., 60; has noted the disease in her breast three years. There is now a very large ulcerated fœtid mass of cancer occupying all the central part of the left breast; it has destroyed the nipple and involved the muscle. There is a large mass of axillary glands; no glands felt above clavicle. Operation, June 14, 1897: very free removal of the breast, with a considerable portion of the pectoral muscle and two large masses of axillary glands. The wound did not all come together. She did not lose much blood, and bore the operation very well, and left the hospital in three weeks.

4. Mrs. T., 40; has noted the disease nine months. She is feeble and wasted; there is a large mass of cancer involving the whole right breast, and a mass of axillary

glands. No glands felt above the clavicle. Operation, July 6, 1898: very free removal, with division of part of the pectoralis. There was a small nodule on the under aspect of the pectoralis. The wound came together at either end, leaving an unclosed surface three or four inches across. It was dressed on the fifth day, and on July 20 the granulating surface was covered with skin-grafts, which took well. She left the hospital in August in excellent health.

These four cases may at least illustrate the principle of extensive operation. The argument from pathology, and the argument from the results obtained by this method, speak for themselves; but there is yet the third argument, that the division or the removal of part of the pectoralis, so far from increasing the difficulty or the danger of the operation, makes them less. You see what you are doing; you avoid working in the dark.

Treatment after Operation.

It is only what we should expect, that the operation should be followed by severe pain and marked reaction. In one of my cases the temperature rose to 104° within six hours after operation; and in many of them it remained above normal for two or three days. The pain is in most cases very severe for about a day and a night; and the patient may complain that she has more pain in her back than in her wound—a cutting or tearing pain down the spine. In one case the patient got great relief from phenacetin, which is often a very valuable sedative, given three or four hours after any operation. But the pain and the distress of mind that so often follow removal of the breast are more likely to need morphia: and the pain down the spine may sometimes be relieved by turning the patient on her side, with a long pillow down her back.

The pressure of the bandages may be harder to bear than the pain of the wound; and it is easy to fall into the error of drawing them too tight, squeezing or nipping the other breast with them, or using it as a fulcrum to apply pressure over the wound. Moreover, the wool packed all over the chest soon gets hard and stiff, and the axillæ and the fold of the other breast get chafed. The risk of secondary hæmorrhage is so small that we must not for fear of it bandage a breast case as though it were an amputation, and the patient herself were the stump. It happened with one of my patients, and only one; and that was because she had a severe fit of coughing a few hours after the operation, and sat up in bed, straining for breath:

Mrs. M., 60; has noted the disease in her breast three months. There is a large mass of cancer in the left breast, and several enlarged glands in the axilla. She is subject to asthma and chronic bronchitis. Operation, May, 1896: free removal. A few hours afterward, in a fit of coughing, she was compelled to sit up, and would not be kept still. Next day the wound was distended with a huge clot, and blood was oozing between the sutures. It appeared best neither to anæsthetize her again, nor to open up the wound without an anæsthetic, but to leave her alone. The central part of the wound broke down, and the clot gradually came away. (She remains free from recurrence, May, 1898.)

In one or two patients who were very thin and ill-nourished, the wound was slow to heal, because there was no depth of tissues between the skin and the ribs. In such cases a tight bandage is worse than useless. And in every case, a few hours after operation, the surgeon should nick the bandages here and there, dividing any edge or fold that hurts the patient; and next morning he may change the outer dressings, wash the surrounding skin, put vaseline or starch-powder to it, and apply fresh

dressings and a cool light bandage; the relief of soft clean dressings, and freedom to draw a deep breath, are a great comfort to the patient. The arm must of course be fixed at first; but the hand and the wrist should be set free on the second or third day after operation, and the elbow on the fourth or fifth day, and the shoulder a few days later: it is wrong to keep the arm bound to the side day after day, or to keep the patient many days in bed. And we are more likely to remove the sutures too soon than to leave them in too long.

Drainage of the axilla is wholly unnecessary: it retarded the healing of many of my cases, and I have not used it for some years. The more extensive the operation, the less reason for drainage; and I have never seen any trouble come of closing the axilla at once. In any case where a tube is put in the axilla, it should be taken out the day after operation.

Results of Operation.

In any series of cases, unless it be of great length, the results are partly due to chance; and with most cases of cancer of the breast we have the right to put some slight faith in chance, not speaking of recurrence as absolutely certain. The patient may live to die of some other disease: one of my patients died of acute pneumonia, another of heart disease, another of epithelioma of the cervix, another of sudden failure of the heart, and another of an accident—all of them free from recurrence. Another died, five years after operation, of 'chronic encephalitis, with paralysis of the medulla'; and another, a year after operation, of 'paraplegia, possibly due to secondary deposit in spine'; but in neither case was there a post-mortem examination. Beside these patients, there were fifteen who were 60 to 70 years old, and five who were 70 to 80 years old. And of the earlier cases, where

certainly chance deserves most of the credit, several are still free from recurrence, many years after operation.

It is not possible, with so few cases, to exclude this element of chance. Yet they are enough to show the chief dangers and disasters that may attend or follow operation. There was no case of pyæmia or septicæmia, and only one—and that the first of all—where the wound was broken down by suppuration; but in several cases, where a tube was put in the axilla, there was a slight purulent discharge for some days from this end of the wound. In one case, many years ago, I committed the blunder of mistaking the induration left by the tube for a recurrence of the disease, and removed the indurated patch under anæsthesia. One patient—it was eleven years ago—had erysipelas after operation; and the case seems to show how erysipelas may arrest cancer:

Miss W., 45; in the lower margin of the left breast there is a nodule of cancer, freely movable; skin adherent. Operation, March 10, 1886: removal of breast; axilla not opened. Recurrence in axilla and axillary end of wound; operation, October 27, 1887, followed by a slight attack of erysipelas. She remained free from further recurrence, and died of heart disease on December 17, 1892.

These cases, and the case of hæmorrhage on p. 69, and one case of suppuration from a blow on the wound a few days after operation, are all the instances where trouble happened with the wound. But the wound, long after it has healed, may be the cause of a false alarm of recurrence; for instance, an old ligature under the skin, not absorbed, may feel just like a minute nodule of recurrent disease; or the evidence given by auscultation and percussion may raise a false alarm that the disease has recurred in the pleura, though there is no recurrence,

only cicatricial changes in the neighbourhood of the wound.

The danger of operation is not in the wound, but in the patient. She may already have an internal deposit of cancer, so that the operation is done in vain, or may hasten her death; and secondary cancer of the liver may advance far before it gives any sign of its presence. In one of my cases, though there was strong evidence of internal disease, operation was done in the hope that some good might yet come of it, and it led to the death of the patient; in another, the patient died three months after operation, of secondary growth in the liver:

1. Mrs. K., 39; disease in breast noted fifteen months; no treatment. 'Pains, suggestive of metastasis, began about nine weeks ago. Well nourished; no sign of pleural or lung trouble. In outer upper half of left breast, a very large hard nodular growth, about $2\frac{1}{2}$ or 3 inches in diameter. Skin adherent; and a typical scirrhous tubercle in it, a little above and to inner side of primary mass. A slight sero-purulent discharge at nipple. One or more small loose axillary glands; nothing felt above clavicle.'

'*Fear of Cancer of Spine, etc.*—About nine weeks ago, she began to complain of pain down the left thigh; this was followed by pain in the back and in the middle part of the lower left ribs. She now has severe and very frequent pain, and is quite heedless of the mass in her breast, which is painless. Over the lower dorsal spine, and over the lower left ribs about the axillary line, there is some tenderness, but not much. No thickening of the ribs can be made out, no deformity of the spine, no dulness. The pain is of a shooting or stabbing sort, and plainly very bad; she can hardly bear to be turned in bed, and she is quite helpless, unable to get about. No loss of control over rectum or bladder; no pain on opposite side of the body. No history of rheumatism, or syphilis, or anything to make one hope that the pain is due to anything except secondary malignant disease. Moreover, the size and duration of the disease, and the presence of a tubercle of it in the skin, make this all the more likely.'

'Moreover, for two or three days after admission she was somewhat odd in her mind at night, rambling in talk, and at times trying to get out of bed; and once or twice by day we found her with a strange dull vacant manner and a dry brown tongue. Urine, no albumen, 1010; no jaundice; no optic neuritis; pulse regular; no fever.'

After some days the spinal and intercostal pain became less, and the operation was done in the hope that it might at least save her from ulceration of the disease in her breast, and in the further hope that her general condition might be due to rheumatism and chronic alcoholism. After the operation she became very violent, screaming and fighting, and then her temperature rose to 104°, with rapid feeble pulse, shallow breathing, and coma, and she died fifty hours after the operation. The post-mortem examination showed many secondary growths in the liver.

2. Mrs. H., 56; has noted the disease in her breast two years; is nervous, depressed, and emaciated. In the centre of the right breast, obliterating the nipple, there is a hard swelling, the skin red and glazed over it. Operation, January 10, 1890: free removal, including a large portion of the pectoralis, in which a nodule was embedded. She bore the operation well, and went home; she died on April 18; 'about ten days before she died, jaundice set in, and examination showed the liver to be much enlarged, irregular in form; edges and surface, so far as could be felt, free from nodules.' (From a letter about the case.)

Alcoholism adds a frightful risk to the operation. Out of all my patients, the operation was fatal in four cases. One of them has just been quoted; another patient, who had been for ten years given to drinking, died on the third day after operation:

Miss J., 54; has noted the disease eight months; it has been treated with camphorated oil, soap liniment, and poultices. History of alcoholism for last ten years. Very excited way of talking; tongue tremulous; thyroid gland enlarged. In the lower half of the left breast there is a large excavated fœtid ulcer, hard and nodular; in the upper inner part of the breast, a hard separate nodule; a

mass of glands in the axilla and below it, and an ill-defined fulness above the clavicle. She was kept in bed for many days before operation, May 26, 1896: free removal, almost circular, so that an unclosed space was left, about $2\frac{1}{2}$ inches in diameter. She did not lose much blood, and took the anæsthetic well. After operation she passed almost at once into a state of restlessness with great excitement and loss of sleep, and high temperature, and died on the 28th.

One patient died of acute shock within twenty-four hours of the operation; there was reason to believe that she had been in the habit of taking stimulants very freely, and at all times of the day, but never to the extent of being drunk:

Mrs. H., 50; in August, 1892, she had a severe blow on the right breast. In April, 1893, there was a small movable mass of cancer deep in the upper outer part of the breast, just where it had been bruised; skin adherent, nipple retracted, axillary glands enlarged. Operation, April 8; she took chloroform, and after the manner of alcoholic patients, requiring a large quantity, talking busily as she was going under it, and alternating rapidly between consciousness and unconsciousness. Free removal. 'The operation was of about average severity and duration; the bleeding was moderate, and easily stopped; only one or two ligatures were used.' She recovered quickly from the anæsthetic, and passed at once into wild excitement, screaming and beyond control. This was about mid-day; at 4 p.m. she had a small dose of morphia; at 5 p.m. she was quieter, but had vomited frequently; at 7 p.m. she fainted, and had a very rapid feeble pulse and rapid breathing. She never rallied, and died only fourteen hours after the operation.

Thus, in three out of the four fatal cases there was a history of alcoholism; and in all three the patient became wildly excited immediately after the operation, screaming and past control, and then sank and died. In the fourth case the patient was 68 years old, feeble, intensely nervous, and terribly depressed at the thought of operation; and

after the operation she passed into a state of dementia, refused all food, and died on the tenth day:

Mrs. E., 68; in the upper part of the right breast, a small deep nodule of cancer. She is subject to bronchitis, and has a 'weak heart'; for the last seven or eight years she has been subject to fainting. She can walk a mile, or a mile and a half, but very slowly and with some difficulty, and finds it hard work to get upstairs. Three or four years ago she was thrown out of a cab, and since that time she has had incontinence of urine, and cannot hold it more than an hour, and is out of bed three or four times in the night. She has a feeble pulse, and a very dry tongue, dark red and glazed. She says it has been like this for some years. Urine acid, 1028, no sugar; distinct cloud of albumen.

The night before the operation, she fainted during the giving of an enema, and was again somewhat faint a few hours before operation. She took the anæsthetic well (gas and ether), and suffered no shock after the operation. This was on November 20, 1891. The axilla was not opened, the operation was soon over, and that evening she was doing very well. Next day, about mid-day, she began rambling in her talk, not knowing where she was, restless; skin hot and dry, tongue dry; no rise of temperature.

November 22.—Still wandering in her mind, but sleeps and takes food well.

November 24-27.—Very little change and no improvement. Now and then she says something rational; very restless at times, having hallucinations. It has become very hard to feed her, as she rejects her food.

November 27-29.—The restlessness has ceased, and she lies half unconscious. It is almost impossible to rouse her or to get her to swallow.

November 30. — To-day the temperature, pulse, and respiration all rose rapidly, and she died this evening.

I have set down all those cases where the operation was fatal. In every one of them there was intense shock, breaking down the nervous system. In two of my cases cancer and insanity were both present together:

1. Miss N., 50; feeble-minded, subject to delusions of persecution; family history of insanity. The right breast and side, from the nipple almost to the scapula, are involved in a mass of ulceration about half a foot across; skin infected far and wide, masses of glands above clavicle; arm enormously swollen. Is not conscious of much pain, and has wholly neglected her disease. Was admitted into a home for the dying (October, 1894).

2. Miss R., 65; disease began fifteen years ago, but she was advised to have nothing done, as it was a 'withering cancer.' There is now a mass of ulceration, five inches across, immovable, extending from the left breast to the sternum; and the right breast is the seat of a large abscess, burrowing into the axilla. She is very excitable, voluble, and eccentric in her habits. I opened the abscess in the right breast without an anæsthetic (October, 1894), letting out a great quantity of pus and sloughs. A few days later she had an attack of acute mania, refusing her food, tearing off her dressings, etc. She remained insane for a month; then got back some measure of self-control; but relapsed again, and died in 1895.

One patient, of a very nervous temperament, drifted slowly after operation, first into 'neurasthenia,' finally into insanity, and died insane six years after operation:

Miss O., 42; thin, anæmic, weakly, and intensely nervous; has noted the disease in her breast four months. In the lower outer part of the right breast there is a large nodule of cancer; skin adherent, nipple not retracted, glands not felt enlarged. Operation, August 4, 1887; axilla not opened. She healed slowly, and remained feeble, depressed, and without interest in anything. In 1890 she was in the same miserable condition; she got great temporary benefit from the Weir-Mitchell treatment, but relapsed as soon as it was left off. In December, 1892, when I last saw her, she was free from recurrence, but hopelessly melancholic, and plainly drifting toward insanity. She went abroad, and died insane in 1893.

In another case, though there was no insanity, yet the knowledge that she had cancer was evidently tending to drive the patient in that direction. Another patient, on

whom I operated in September, 1897, has lately had an attack of insanity, May, 1898. She showed no sign of mental trouble at the time of the operation, and made a good recovery; and her present condition is assigned to some recent troubles in her family.

Thus we come back to the point whence we started—the overwhelming personal element in cancer of the breast. It is not a matter of chance that most of these patients waited for months or for years before they submitted themselves to operation; it is not a matter of chance that so many of them broke down afterward; that no less than six out of sixty-seven either were insane or were in danger of insanity.

SOME RUN-OVER CASES.

It is of course impossible to make a separate class of the injuries that come from a heavy weight passing over the body; yet these run-over cases are so common in hospital practice, so urgent, and so uncertain in their issue, that they have, as it were, a special place in surgery; at least, they present special difficulties of diagnosis and treatment. Taking abdominal cases only, and setting aside those that were uneventful and recovered in a few days, I have about a dozen cases that may be worth reading. One of them, where the bladder was ruptured, is not put here, because I want to note only those cases where we are most at a loss to say how much damage has been done. The notes of one or two other cases have been mislaid, so that the list is incomplete: and in none of the cases was Senn's test employed —the introduction of hydrogen by the rectum, to see whether it escapes through a rupture of the intestine and changes the percussion-note over the liver—so that all of them, in a way, are incomplete; but they illustrate the great uncertainty of all abdominal run-over cases, and show that we may be at first wholly unable to say what has happened.

In none of them was the stomach or the intestine ruptured. In one, the left psoas muscle; in three, the kidney; in three, the spleen; and in five, the liver.

Several of the patients, though neither the stomach nor the bladder was ruptured, yet vomited blood, or passed it with their urine. Especially with small children, it is no uncommon thing to find hæmaturia for some days after this sort of accident—the urine first bloody, then smoky, then just tinged with blood; and in run-over cases, neither hæmaturia nor hæmatemesis, apart from other signs, gives any indication for operation, but rather the reverse.

Again, we get no sure guidance from the general state of shock that is so alarming in these cases; we cannot separate the general condition from the local injury, look through the shock and see what actual damage has been done to the viscera. They are like patients who have been badly burned: the same coldness, prostration, restlessness, thirst, and intractable vomiting. All these symptoms, though the patient has been run-over, may yet be due to shock alone, not to any internal injury; they are only what you get with a bad burn. Two things are to be remembered in every run-over case: that the patient has just had a sudden overpowering fright, and that a simple strain of the abdominal muscles may imitate internal injury. It is probable that many of these patients, writhing under the wheel, or thrown off a bicycle and then run-over, put a sudden heavy strain on their abdominal wall; and it is certain that a simple strain of this sort, such as comes of lifting a heavy weight, may cause not only intense pain, but also vomiting.

If it be true, as my cases seem to show, that laceration of the solid viscera is much more common than rupture of the intestine; that hæmatemesis and hæmaturia, taken by themselves, are no reason for operation; and that we cannot decipher the local injury through the general state of shock; then what guidance have we got, at first, for

the treatment of these run-over patients, and what are the indications for exploratory incision? Take the three following cases:

1. A boy, 6½ years old, was admitted to hospital at 6.30 p.m., September 5, 1894, having been run-over by a van. It was said that 'one wheel went over his chest and another over his stomach.' He was in extreme collapse, cold, very restless, and complaining constantly of thirst. He had passed a motion soon after the accident; no blood had been noted in it. He had been sick once, only slightly; no blood with the vomit. At 9.30 p.m. the shock was passing off; the abdomen was retracted, but moved freely; it was not tender—indeed, he said that he liked having it very gently rubbed.

September 6.—Did not sleep well; is still very thirsty, and keeps constantly asking for water; keeps drawing up his legs; passes water every fifteen or twenty minutes, with some pain; vomited twice to-day. This evening there is slight general distension, with slight pain and tenderness across the upper part of the abdomen. Respiration 44; pulse 94; temperature 99°.

September 7.—Still very restless and very thirsty; respiration and pulse very variable. Respiration 30 to 46; pulse 78 to 128; no more vomiting, and less irritability of bladder.

September 8.—Some improvement, but still slight tenderness and fulness of abdomen. Respiration 26 to 30; pulse 80 to 100; temperature normal.

September 9.—Bowels acted twice last night; he slept soundly; and to-day he is much better in every way.

September 27.—Discharged.

2. A young man, 25 years of age, was admitted to hospital 8 p.m., March 27, 1894, having been knocked off his bicycle and run-over by a van. The wheel went straight over the upper part of the abdomen. He was suffering from severe shock, with much pain across the chest and over the bladder. He vomited repeatedly through the night.

March 28.—I saw him for the first time this morning. Vomiting not yet stopped. Complains bitterly of thirst, which is not alleviated by sucking ice. General condition good. Very nervous temperament.

March 29. — Vomiting not yet stopped. What he brought up last night was turbid brownish fluid; what he brought up this morning is clear, thin, watery fluid of a greenish tint. To-day the whole abdomen is greatly distended, but not tender. The bowels have acted loosely several times. His general condition is very good.

March 30.—No vomiting since mid-day yesterday. The distension has subsided as quickly as it came, and he is much better in every way, but intensely nervous about himself.

April 10.—Discharged.

3. A boy, 14 years old, was admitted to hospital 5.45 p.m., May 1, 1891, having fallen between the platform and a train backing into a station. It had taken half an hour to get him out. On admission he was frightfully collapsed, cold, face greyish, radial pulse imperceptible. He complained bitterly of thirst. Beside other injuries, he had severe pain diffused over the upper third of the abdomen, which was held fixed and rigid in respiration. At 8.30 he became restless, tossing about in bed and sitting up. At 10.30 he suddenly vomited a great quantity of fluid; collapse passing off; pulse 160.

May 2. — Vomited once this morning. Still suffers intense thirst. Pain less diffuse, localized in the lower costal cartilages. Abdomen moves freely on respiration; bowels have acted naturally. Pulse 134.

May 3.—Passes water without the catheter. Takes nourishment well. Pulse 160; temperature 101°.

May 5.—Better in every way. Pulse 92; temperature normal.

These patients, by the help of careful watching and nursing, all got well without operation; and I could add to them other cases, not much less severe, that did the same. But these three cases presented, most unmistakably, signs enough to justify exploratory incision: collapse, restlessness, persistent intractable vomiting, the onset of intense thirst immediately after injury, the abdominal wall either retracted and rigid, or distended with inert dilated coils of intestine. All these things

suggested some very serious internal injury, and the need for exploratory incision; but they passed off, and the patients recovered without operation.

Among their many symptoms, two were of special interest: the immediate onset of thirst, and the rapid distension of the intestines. The thirst does not prove anything; it gives no evidence either of internal hæmorrhage or of rupture of the intestine. It is common in cases of strangulated hernia, in burns, and after all sorts of operations; it is part of a general change in the central nervous system. There is, I think, reason to believe that our senses of thirst and hunger are both of them represented in the higher cerebral centres, probably in the temporo-sphenoidal lobes. Some cases supporting this idea will be found at the end of these notes. But whether there are or are not localized centres in the brain for the perception of these feelings, it is certain that intense thirst may occur after any bad shock, altogether apart from any abdominal injury; therefore its occurrence after abdominal injury gives us no guidance either toward diagnosis or toward treatment.

The rapid distension of the intestines, which happened in two of these cases, and in one or two other cases whose notes I have mislaid, and only remember that they recovered, begins about twenty or thirty hours after the injury; and it is attended by pain, tenderness, and vomiting. Probably it is due, in every case, to peritonitis; and this peritonitis, under careful treatment, is likely to remain limited in extent, and to end in resolution, not in acute septicæmia, nor in general suppurative peritonitis. At least, I remember several cases of this kind that ended in this way; and if the patient, during the first four-and-twenty hours after the accident, has on the whole gained

ground, has got over most of the shock; if his temperature has risen to normal or a little higher, and his pulse is fairly strong, and he is less restless and more 'like himself,' then it is probable that the distension of the intestines is due to simple localized peritonitis, not to the escape of fæces into the peritoneal cavity. Perhaps, in these run-over cases, we may even go a little further than this, and believe that in some of them, or to some extent in most of them, distension of the intestines may occur without peritonitis, as the direct result of contusion without rupture. For we do not know much for certain about the conditions that regulate the intestinal gases in health; and we know that any severe shock, either bodily or mental, may cause changes in the intestinal action. Again, in strangulated hernia, general distension is usually a late sign, and a very bad omen and evidence of peritonitis; but I have also seen it well marked in a case where everything was favourable, and the hernia had been but a few hours strangulated. Therefore it is possible that a run-over patient may have distension without peritonitis, or with very little peritonitis. But in the cases just mentioned there was well-marked peritonitis; and the treatment that gave most relief was the free application of leeches, from twelve to twenty, followed by hot fomentations, with small doses of morphia, and very careful watching and nursing.

But is there no sign, within the first twelve or twenty-four hours after the injury, to tell whether the intestine is ruptured? Perhaps the most trustworthy signs are: (1) The abdominal wall kept rigid and retracted; at no time soft or moving in respiration, but remaining rigid and concave for a day or longer, and then becoming distended. (2) Persistent hiccough. (3) No improvement in the patient's general condition at the end of

twenty-four hours; the initial shock was perhaps not very severe, yet he does not rally from it. (4) Some deep point of extreme tenderness.

But these signs may be absent or uncertain; and Senn's test is not within the reach of everybody, nor always to be trusted. The evidence of internal hæmorrhage is sometimes plain enough—the rapid increase of weakness, the rising dulness in one or both lateral abdominal regions; but the evidence of ruptured intestine may be sought most carefully, and sought in vain, till the patient is past saving by operation.

Seeing all these difficulties, have we a refuge from them in the habitual practice of the exploratory incision? Are there any urgent reasons against it?

By the term 'exploratory incision' we mean abdominal section done at once; for whether the incision is two inches or five, the preliminaries are the same: the abdomen is exposed and scrubbed, the patient is taken out of bed, carried about on a stretcher, subjected to the fear of operation and to the influence of the anæsthetic. All these things are bad for him; but that does not prove anything against the operation. Next, there is the risk that the surgeon may be led, by what he finds, to do more than he ought: the presence of blood in the peritoneal cavity may lead him to make a prolonged search for the source of the hæmorrhage, though the patient may have ceased to bleed. This objection may be theoretical. But practically, so far as my handful of cases can prove anything, it shows that patients who have been run-over across the abdominal region are more likely to be suffering from hæmorrhage than from rupture of the intestine; and—though so few cases are almost worthless—they do not, so far as they go, furnish evidence in favour of a general employment of the exploratory operation.

Six cases where the symptoms were of the utmost severity, and some more where they were somewhat less severe, but still very serious, recovered without operation. Against them I will set all the cases that either died, or recovered after operation. The list is necessarily of considerable length, but each of them has some points of interest; and there is no way, except the perusal of cases, by which we can see the whole difficulty of this subject:

1. **Rupture of Liver. Death in fifteen minutes.**—A boy, 12 years old, was run over the body by a light spring-cart, and was brought at once to the hospital, October 7, 1896. 'On admission, the patient was blanched and dying. Pulse imperceptible, respiration long and sighing, heart still beating feebly. He died fifteen minutes later. Post-mortem, rupture of liver between the two lobes; abdomen full of blood.'

2. **Rupture of Liver, Spleen, and Kidney; Fractured Ribs. Death in eight hours.**—A middle-aged man, run-over by a van, was admitted to hospital on April 30, 1898, and died about eight hours after admission. His urine was drawn off, and found free from blood. Post-mortem, liver ruptured in two places, both in front and behind; spleen torn right away from its vessels, and only hanging by a shred; one kidney ruptured; two ribs fractured on one side, three on the other; both lungs lacerated.

3. **Rupture of Liver and Spleen. Operation; death in ten hours.**—A child, 6 years old, was run-over, and admitted to hospital March 29, 1897. 'Very pale and much collapsed. Marks of bruising. Some dulness in hypogastrium. He was taken to the theatre, and incision was made in the middle line below the umbilicus. When the peritoneum was opened there was a free discharge of dark blood. A good deal of the intestines was drawn out, but no bleeding point was found. The incision was carried upward, and the spleen felt for and brought into view. On its posterior side there was a laceration. There was bubbling of air into the blood lying in that part of the abdominal cavity which was near the spleen, as though the diaphragm and pleura had been torn. The bleeding from the spleen was not profuse. A gauze strip was put in, with the object of controlling bleeding

from the spleen, but it did not exercise much pressure on the laceration.' He never rallied, in spite of all treatment; and died about ten hours after the accident. Post-mortem, the liver was found ruptured, the spleen was lacerated; there was also hæmorrhage round the right kidney; the diaphragm was not ruptured.

4. **Rupture of Liver. No operation; sudden death on tenth day from secondary hæmorrhage.**—A boy, 10 years old, was admitted to hospital on August 16, 1897, having been run-over by a cart 'somewhere over the region of the liver.' On admission he was very blanched, restless, and in great pain. Pulse 160; respiration 48; temperature 97°; and that night he was sleepless, and constantly vomiting. 'When I saw him next day there was no sign of internal hæmorrhage, and most certainly no reason to interfere. By the second or third day he kept his legs well down, and was grumbling at his low diet, always asking to be allowed to get up, always kicking about in bed. About the fifth day, he had a sudden rise of temperature—about 103°—and looked ill and pale; but, so far as I remember, he had no rigor. About this day, too, a very curious thing happened: he complained, for the first time, of pain at the back of the right side of the neck, in the muscles, like a stiff neck; and I thought, but was not sure, that the muscles here felt a little stiff to the touch; but when I made pressure where the pain was in the neck, he complained that it gave him pain over the liver; and this pain he could exactly localize, putting his hand over the front of the liver. There was no doubt about this strange fact, that pressure over the right side of the back of the neck gave him pain over the front of the liver.' On the 23rd (seventh day) his temperature and pulse rose a little, and remained henceforth above normal; temperature 100° to 101°; pulse 100 to 130; respiration 28 to 44; and about this time we thought that we could make out a slight increase upward of the liver dulness in the mid-axillary line, as if from a slight pleural effusion. On the 25th he seemed very well — no pain, only a cough, which he had had for some days; he was 'always coughing'—a dry, short, nervous cough. On the 26th, as he would not lie still in bed, he was allowed to sit up for a short time. About half an hour later, while coughing, he was suddenly seized with signs of internal hæmorrhage, and died in

half an hour. Post-mortem, a quantity of fluid blood in the peritoneal cavity; a serous effusion in the right pleura, about a pint; the lateral aspect of the liver was covered with thick dark tough clot, some days old; and the liver was very badly lacerated in two places—a large deep posterior laceration, and a more superficial laceration in front.

5. **Rupture (?) of Liver or Spleen; Internal Hæmorrhage; Operations on second and sixteenth days; Recovery.**—A boy, 16 years old, was admitted to hospital on June 27, 1898, having been run-over by a four-wheeled van, which went 'right over the abdomen.' On admission he was collapsed and pulseless; and it was said that he had vomited pure blood on his way to the hospital. 'The abdomen moved, but not freely; it was not distended; it was resistent to palpation, and very tender; the tenderness was not localized in any particular region. No free fluid was discovered in either flank on percussion; liver dulness was not lost. He complained a good deal of thirst; could not draw a deep breath; lay with his legs out, not drawn up.' At 7 p.m. the house-surgeon's note says: 'Abdomen is more distended; complains of pain in abdomen, which shoots round to both shoulders. His chief complaint is about his thirst. No more vomiting. Breathing rapid and short; hurts him a good deal to breathe.'

June 28, *morning*.—'The abdomen is more distended; still moves fairly well; tenderness is more marked. There is more dulness in both flanks than yesterday. His pulse is fuller and better than yesterday, 120; respiration very rapid and shallow, 48; temperature 102°. Has vomited some clots of blood four times during the night. Still complains of great thirst.'

Afternoon.—'Has just vomited some greenish, bile-stained fluid; no blood in it. Operation at once; chloroform; on opening the peritoneal cavity a quantity of blood escaped, and continued to do so for some time. There was no sign of peritonitis, and no fæcal material in the peritoneal cavity. The blood was of a dark brown colour, and did not look as if it had been poured out from any viscus quite recently. The source of hæmorrhage was not discovered, nor even sought, as Mr. Paget feared restarting a hæmorrhage which had probably ceased. The peritoneal cavity was washed out with salt solution, ʒi.—Oi. His condition improved when the blood had

been let out of the peritoneal cavity, and also when the abdomen was irrigated with saline solution. No drainage was used. After returning to bed he was very restless, and once tore all his dressings off. He vomited once after the operation; still complains of much thirst.'

For the next nine days (June 29 to July 7) he steadily gained ground in every respect, though his temperature, pulse, and respiration remained high for four days after the operation, and he was sometimes very restless. About the fifth day after operation, a curious fact was noticed: if he drank a few mouthfuls of fluid, he felt a sharp pain in the left shoulder, passing downward across the chest toward the liver. He could localize this pain very accurately; and it occurred again and again each time he took a little fluid into his stomach. On the ninth day (July 7) his temperature, pulse, and respiration began to rise again, and he had some abdominal pain.

July 11.—'Complains of much pain in abdomen; very restless; abdomen full; moves slightly with respiration, very tender; tongue dry and furred; bowels opened five times yesterday. Pulse 112; respiration 38; temperature 103°.'

July 12.—'Operation 10 p.m. Mr. Eccles opened up the old scar; peritoneum much thickened; contained blood-stained fluid, not purulent. About a pint and a half was let out, and the cavity was flushed out with hot boracic lotion. The intestines were very adherent, and their coats injected. Keith's drainage-tube.'

For a fortnight after this second operation he was weak and feverish, with diarrhœa, not taking his food well; then he began to gain ground rapidly. On August 12 he was allowed to be moved into the garden; on August 31 he was allowed to walk; and on September 5 he left the hospital.

6. **Rupture of Spleen; Fracture of Thirteen Ribs; Pleurisy. Death on fourth day.**—A middle-aged man was admitted to hospital on February 26, 1895, having been run-over by a cart. Both wheels went straight over the epigastric region, from right to left; there was no external bruise. The house-surgeon's notes say: 'Very collapsed and blue; much dyspnœa; fractured ribs in posterior axillary line; five estimated as fractured.'

February 27.—'Still very collapsed. No hæmoptysis.

Frequent and profuse vomiting. Abdomen moves well; no sign of any injury within.'

February 28.—'Still very collapsed and blue; great dyspnœa. Has sweated all along freely, and it is quite impossible to get him warm. Temperature subnormal; pulse compressible, but fairly good. Abdomen seems normal.'

March 1.—'Very bad last evening, nearly died; very collapsed. Vomiting stopped yesterday afternoon. Abdomen seems normal. No hæmoptysis; he appears like a man dying of bronchitis with fractured ribs. No pneumothorax found, although an area of hyper-resonance at right base. Extreme blueness, collapse, and dyspnœa; evidently dying. Has taken fluid food throughout with ease and without pain. Oxygen gave some relief. Died at 6 p.m. Post-mortem, spleen ruptured into four fragments; blood, one or two pounds, in clot in splenic pouch; blood in general peritoneal cavity and pelvis. A pint and a half of blood-stained serum in the left pleura; left lung collapsed; five ounces of blood in the right pleura; ribs fractured on left side, second to sixth inclusive, in anterior axillary line; on right side, second to ninth inclusive, in posterior axillary line.'

7. **Rupture of Psoas Muscle; Peritonitis. Death on eighth day.**—A child, 2 years old, was admitted to hospital on October 10, 1893, having been run-over. 'No bruises or abrasions could be discovered on examination; the child was conscious and quite quiet, but cold, cyanosed, and suffering from dyspnœa.' In the evening his condition was improved, and the house-surgeon's note for October 11 only says: 'Patient seems quite well and happy and free from pain.' Two or three days later his temperature began to rise, and at this time he began to have vomiting, with abdominal distension. 'Breathing shallow and rapid, 52, with harsh sounds everywhere, and at the left base occasional moist râles.'

October 16.—'Breathing rapid and shallow, 48; impaired resonance over left lower lobe, with abundant moist râles. Absolute dulness over right base; bronchial breathing over scapular and upper axillary regions, with impaired percussion-note; veins enlarged; œdema of chest-wall. No cough.'

Beside these signs in the chest, there was also abdominal distension, with occasional vomiting; and the

tissues of the left lumbar region were swollen, hard, and œdematous, as though a retroperitoneal abscess were forming here; but only a little serous fluid escaped on exploratory incision through the swelling. The vomiting stopped on the 16th, but diarrhœa set in, and the child became rapidly weaker and more feverish, and died two days later. The temperature, a few hours before death, was 104°; pulse 150; respiration 60. My own notes of this case have been lost, and I remember only that the post-mortem examination showed no rupture of the viscera, but a large hæmorrhage into the substance of the left psoas muscle, so that the whole muscle was greatly swollen, and, as it were, ploughed up inside.

8. **Rupture of Kidney; Intraperitoneal Abscess. Operation; recovery.**—A boy, about 7 years old, was admitted to hospital on the evening of April 24, 1895, having been run-over by a van. 'The wheel struck him on the left side, but did not go over him.' There was no very severe shock. He vomited some blood-stained fluid three hours after the accident; and his urine was deeply blood-stained.

April 25.—Abdomen distended; tenderness in the left flank, which is badly bruised. The child is very drowsy.

April 27.—Vomiting, distension, and fever; dulness, œdema, and increased tension in the left flank.

April 29.—No vomiting since last night; great distension, but without marked pain or tenderness, and without obstruction. He is feverish and apathetic; the abdomen does not move in respiration, and the dull area is enlarged. There has been no blood in the urine for the last two or three days.

Operation was delayed for several days longer, as his general condition seemed to be slowly improving; but this delay was altogether wrong. Incision in the left flank let out two and a quarter pints of fluid; first thin turbid brown urinous fluid, and, when this had escaped, pus mixed with masses of lymph. The cavity was intraperitoneal, and extended down into the pelvis out of reach of the finger, and up toward the diaphragm. A small slough escaped with the fluid. On June 18 a counter-opening was made further back. The child recovered, and left the hospital on July 30.

I cannot call to mind more cases, or find notes of them,

except some that were less severe, and ran an uneventful course toward recovery. These have no especial interest, though several of them presented for many hours the signs of shock, and it was at first impossible to say how they would end. And, so far as they go, these less severe cases, that all recovered without operation, are against any general use of the exploratory incision.

Of course, my handful of cases is too small to have much weight; yet they are not altogether useless. They are not evidence against exploratory incision in a somewhat different set of cases, where a sudden smashing blow is concentrated on one small area of the abdomen—for instance, a savage kick, or the flying back of the handle of a windlass, or the thrust of a cart-shaft pinning a man against a wall: but in run-over accidents the violence is spent over a wider range, and the patient may have just time to adjust himself to bear it. In all these cases the immediate shock is much the same, whatever damage has been done; there is no sure sign, at first, what has happened; but laceration of the liver or the spleen is more common than laceration of the stomach or the intestine, and simple localized peritonitis is more common than acute suppurative peritonitis. And there is, I think, some reason to limit the value of exploratory incision—that is, abdominal section done at once. Of my cases, the majority recovered without operation; two recovered after operation, but in neither of them was it a true exploratory incision. Two died after operation; in one of them it was a true exploratory incision, in the other it was not. Four died without operation; one in a quarter of an hour, with ruptured liver; one in eight hours, with ruptured liver, spleen, and kidney; one on the fourth day, with ruptured spleen, thirteen ribs fractured, with acute bronchitis, and pleurisy with effusion—

in these three cases operation would have been worse than useless; the fourth patient died not of primary hæmorrhage, but of secondary hæmorrhage, on the tenth day, and his liver was ruptured both in front and behind. This does not encourage me to make habitual use of the exploratory incision. Absolute rest, morphia, in some cases the free application of leeches, and in all cases the most vigilant nursing and hourly watching, are, I believe, still the best treatment for run-over cases. We must be ready to interfere at any hour, but we ought not to perform immediate abdominal section on the bare chance that the intestine has been ruptured.

The pain felt in the shoulder, or at the back of the neck, in cases 4 and 5, is worth noting; and this pain, in any abdominal run-over case, should, I think, be taken as evidence of laceration of the liver or spleen.

Reference has been made in these notes to a curious association of voracious hunger and thirst with injury or disease of the brain, suggesting that there are special centres, probably in the anterior part of the temporo-sphenoidal lobes, where these special senses are localized. I am allowed by the Council of the Clinical Society to reprint here a paper on this subject, published in the Society's Transactions, vol. xxx., 1897.

On Cases of Voracious Hunger and Thirst from Injury or Disease of the Brain.

Some years ago I brought before this Society a case of cerebral abscess from disease of the middle ear in a boy 12 years old. The abscess was in the left temporo-sphenoidal region, and the patient was twice trephined, as the first opening was too high up to drain the abscess properly. Three days after the first operation the notes

say: 'His appetite is remarkable; he begs for solid food, and says: "I want to go home; they don't give me enough to eat here."' Two days later the notes say: 'Restless and noisy; appetite ravenous.' At this time he had partial aphasia; he lost the power of naming things, and would use the same word for different things. After the second operation he slowly recovered, and is now in good health.

This ravenous appetite was a most remarkable feature of his case. Even when he was at his worst—delirious, lying in a state of stupor or screaming wildly—he would eat and drink greedily, taking more food than any man in the ward. No exact record was kept of the amount of solid food that he consumed; but, as we watched him from day to day, it was impossible to doubt that we had to do with a genuine case of voracious appetite, due to cerebral abscess.

I have collected several other cases to prove this point, that injury or disease of the brain may directly cause great hunger and thirst. These cases are, of course, to be distinguished from cases of traumatic diabetes, where thirst is only the result of increased excretion of urine.

1. A young man fell out of a waggon, and struck his head against a stone. He was at once admitted to hospital, unconscious, and bleeding from the left ear. For the first three days he was now drowsy, now delirious. The diagnosis was fracture of the base. On the fifth day he regained consciousness, and at the same time became inordinately hungry; the usual diet wholly failed to satisfy him. He constantly complained of hunger, and even cried for food. Six pounds of bread daily, beside other articles of diet, were not enough for him. The bowels acted regularly; there was no excessive thirst; the daily quantity of urine varied from two and a half to three pints. After ten weeks, his appetite fell to normal.

2. A man, aged 35, was kicked by a horse on the left abdominal wall, and fell backward heavily, striking the

back of his head on the ground, and coming down with his right ear against a piece of wood. He was stunned, and unable to rise. Half an hour later he felt great thirst, and drank more than five pints in the next three hours, before admission to hospital. For a few days he had pains in the abdomen and at the back of the head, but these soon passed off. He was still suffering from thirst a fortnight after the accident, when he left the hospital at his own request. The accident occurred between seven and eight o'clock in the evening, and he first passed water after it about eleven o'clock, having already drunk five pints of fluid. Next day he drank twenty-one pints and a half; the day after, thirty-two pints and a half; on the seventh day, twenty-eight pints; on the eleventh day, thirty pints and a half. A few days later, when he left the hospital, his average had fallen to nine pints. There was no dryness of the mouth or fauces, and the skin acted freely. The urine was always clear, pale, acid, free from sugar or albumen.

3. A man fell from a high scaffold, and was at once admitted to hospital. Beside other injuries, he had a contused wound of the right side of the forehead, and hæmorrhage from the left ear. He was unconscious for five days; at the end of that time he was able to answer questions, but was still confused and incoherent. He now began asking constantly for food and drink. A fortnight after the accident he was more sensible, understanding what was said to him, and answering slowly but correctly; he was still constantly asking for food and drink. During the next few days he drank daily from seven to twelve pints; he would call at the top of his voice for food and drink, and on one occasion he drank twenty-four pints and a half in one day. After some weeks his thirst slowly abated, and he left the hospital in good health eight weeks after admission.

4. A young woman, 24 years old, was knocked down, and fell with her head against a step; she had concussion, with vomiting, followed by feverishness. This lasted about a week; she then began to have a voracious appetite, so that she would not leave the house, even to go a short distance, without taking a supply of food in her pocket. This abnormal hunger lasted about three months, varying from time to time in its intensity.

5. A young man, 18 years old, working in a saw-mill,

was struck with a piece of wood on the right side of the forehead, and was unconscious for some hours; then came violent headache, fever, shivering, and intense thirst. Two days later he was well enough to go back to work, but his thirst persisted; and three weeks later he came to hospital, begging to get relief from it. He was in good general health, his appetite for solid food was not excessive, he complained of nothing but extreme thirst, drinking all day, and waking at night again and again to drink. On one occasion, in twenty-four hours, he drank no less than fifty-two pints and a half. His urine was almost pure water, and did not contain any trace of sugar. He was treated with large doses of valerian, and in three weeks his thirst was much abated, and was daily getting less.

These five cases, and my own case, cannot be explained away as cases of hunger and thirst secondary to traumatic diabetes. Three of the patients were not abnormally thirsty, but had a voracious desire for solid food—great quantities of bread and meat. A fourth patient used to clamour both for food and for drink, even while he was delirious. In a fifth case the injury to the brain occurred between seven and eight o'clock, and when the patient first passed water after the accident, at eleven o'clock, he had already drunk five pints of fluid; and in the next forty-eight hours he drank fifty-four pints. In the last case the thirst began on the same day as the accident, and finally reached such a height that the patient in twenty-four hours drank fifty-two pints and a half.

The next two cases are of the same kind, but we have only the patients' accounts of the onset of their intense thirst:

1. A man, aged 27, fell from a height on his head, and suffered compound fracture of the right frontal bone, with such severe concussion that he was unconscious for eleven days. He was in hospital more than a month, then tried to get back to work, but found himself wholly unfit for it,

and was admitted into another hospital; here he told them that ever since his accident he had suffered constantly from extreme thirst, and had drunk as much as forty-three pints in twenty-four hours. He suffered severe attacks of headache and giddiness, and was slow of speech, and unsteady on his feet, tending to fall backward; there was loss of power in the right side of the face and the right arm, complete loss of vision in the right eye, sleeplessness, and general loss of strength. The accident happened in June; the excessive thirst lasted till September.

2. A boy, aged 12, was kicked on the forehead by a horse, the wound being so severe that it took a month to heal. Six years later, he came under the care of Charcot, with a slight attack of modified small-pox. He said that ever since his accident, six years ago, he had suffered intense thirst, both day and night. During the attack of small-pox his thirst abated, afterward it returned; he drank ten or twelve pints during the night; he also ate voraciously. His urine was almost pure water, and contained neither sugar nor albumen. Though he had suffered from this constant thirst for six years, he was in good health, and had not lost flesh.

The next two cases are examples not of thirst, but of hunger. Unfortunately, we have not got a full account of them:

1. A young man received a gunshot wound of the head, the bullet entering near the junction of the parietal and occipital bones. In hospital he was delirious, and suffered complete loss of memory; and it was noted that sometimes he would not eat, but at other times his appetite was ravenous. A month later, he was much improved; he ate regularly, and his memory came back to him; but he had partial aphasia. Later still, he became epileptic.

2. A man, 36 years old, suffering from mitral disease, was seized with epileptiform convulsions, right-sided hemiplegia, and aphasia. In the course of a few months he recovered, but later in the year he had a second attack like the first. After this second attack he began to complain of hunger, first at longer intervals, then almost every hour; but it was always appeased with small

quantities of food. In these attacks of hunger his pulse was slow, irregular, and intermittent.

The next two cases occurred in the private practice of Mr. W. H. Bennett, who has kindly allowed me to make use of them :

1. A man, 32 years old, was struck with a hockey-stick on the left side of the head, and was unconscious for about a quarter of an hour. He made light of the accident, and neglected treatment for a week ; he was then kept in bed for some time under treatment. About a month after the injury, he began to have a voracious appetite for solid food ; he would eat a whole chicken at one meal, and on one occasion ate twelve large slices of meat for lunch, beside vegetables, sweets, etc. He had no excessive thirst. This abnormal appetite lasted over a year, and the appetite has not yet quite come back to normal.

2. A man, about 35 years old, fell off a rick of hay, and came down in a sitting posture. He was severely stunned, and was kept in bed on a low diet. About a month after the accident, he 'was found to have a very large appetite, which was practically insatiable.' He preferred such food as eggs and puddings to meat, and would eat at one meal eight or ten eggs and the whole of a good-sized pudding. He had no excessive thirst. His appetite became normal in about nine months.

The two next, and last, cases I owe to Sir Thomas Smith ; they both occurred in his private practice :

1. A young man, 20 years old, subject to a chronic discharge from the ear, received a violent blow on the head by coming into collision with another man in a swimming-bath. The accident was followed by acute fever, with aggravation of the disease of the ear, and with signs of thrombosis of the lateral sinus and the internal jugular vein. Operation showed a suppurating cavity in the petrous bone, containing dermoid substance. From the onset of his acute symptoms, the patient had been subject to a voracious appetite ; and this continued after the operation. He would eat one plateful of meat after another, and would wake during the night with hunger.

His appetite was always appeased by food, but it did not return to normal till three months after the operation.

2. A man, 32 years old, fell from his horse, and presented the signs of a fracture of the base of the skull. He recovered, and in a month was able to get about. A note of his case, about three months and a half after the accident, says: 'At the present time he has only slight headache, and sometimes slight giddiness. Ever since the accident he has been very thirsty, and he had at first a voracious appetite. Now his hunger is much less, but the thirst continues. There is much bruising of the left side of the face, and some loss of sensation along the gums on that side of the mouth.' The urine contained neither sugar nor albumen.

Remarks.—These fourteen cases seem to show that injury or disease of the brain may be followed by voracious hunger and thirst, occurring as a direct result of this injury or disease. And I submit that these cases are evidence of the existence of special centres in the brain, for the perception of hunger and of thirst; which being deranged give rise to abnormal desire of food and drink. It has also been noted by Sir W. Gowers, that a voracious appetite has been known to occur in cases of cerebral tumour.

In these cases that I have just read, this voracity was not the healthy appetite of convalescence, for as a rule it came on immediately after the injury, and lasted for many weeks or months after complete recovery; and in some of the cases it was intense long before the patient began to be convalescent. Nor was it due to any general mental condition that could be called eccentric or deranged or hysterical: only one of the patients was a woman; thirteen of them were boys or young men, who were most of them in sound bodily and mental health, hard at work both before and after the injury. Nor was it secondary to any sort of traumatic diabetes, for eight

out of the fourteen patients suffered, not from thirst, but from hunger for solid food; three had hunger and thirst together; and only three had thirst without hunger. Moreover, the history of the cases is irreconcilable with the belief that they were cases of diabetes.

The nature of the primary injury or disease in each case was as follows: Four of the patients received a severe blow on the forehead, two were struck on the side of the head, two fell on the back of the head, two presented signs of fracture of the base, one fell from a height and came down in a sitting posture. To these eleven cases of injury are to be added three cases of disease; one had a suppurating cyst in the neighbourhood of the right temporo-sphenoidal lobe, one had abscess of the left temporo-sphenoidal lobe, and one had mitral disease, aphasia, and right hemiplegia.

Every one of the patients recovered; it is evident therefore that these centres of hunger and thirst, if they do exist, are not situated in the immediate neighbourhood of the vital centres. Three of the patients had well-marked aphasia. From this fact, and from the general history of the cases, there is some reason for placing these centres in the neighbourhood of the centres of speech, probably in close relation with the olfactory centre in the temporo-sphenoidal lobe.

With regard to the treatment of these cases, it appears that no harm came of allowing the patients freely to satisfy their craving for food and drink. Some benefit is said to have been got from chloral, bromide, and valerian; but as a rule the voracious appetite lasted for several weeks or months, and then ceased of itself.

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NOTE.

In the discussion of this paper, similar cases were described by Dr. Kingston Fowler and Mr. Wallis ; and Sir Thomas Smith called attention to the fact that these patients, though they take an inordinate amount of solid food, yet digest it all, and suffer no inconvenience from it.

ELEMENTS OF AURAL SURGERY.

THE history of aural surgery is a good illustration of the fact that we must get our knowledge by practical work, must see and do the things for ourselves, not read about them. The common diseases of the ear and the upper air-passages will certainly come to every man in general practice; and the treatment of them depends on experience alone. We cannot learn from books the appearance of the membrana tympani, the feel of the naso-pharynx, or the use of Politzer's bag; we have only one way open, and that is through work among out-patients. To advance, we must follow the lines on which aural surgery has advanced :

1. More careful study of the symptoms of aural diseases.
2. More accurate instruments for examination and treatment.
3. More careful study of the pathological results of aural diseases.

A short account of this advance of aural surgery may be useful here. I have taken a part of it from St. John Roosa's book on the Diseases of the Ear; you see through it all how practical work was the one thing that did any good.

Leaving out the ancients, begin with the great anatomists of the Renaissance—Fallopius, Eustachius, Fabricius, and, above all, Vesalius. These men laid the

foundations of modern aural surgery; and they handed on the work to other anatomists like themselves—Casserius, Steno, and Du Verney in the seventeenth century; and in the eighteenth Scarpa, Morgagni, Cotunnius, and, above all, Valsalva. The surgeons hardly made a beginning till the anatomists had finished their share of the work. How could the surgeons begin, when they had no instruments? Up to the time of Ambroise Paré (1510—1590) they had not so much as a syringe, only some probes and hooks for the removal of foreign bodies from the meatus; and, to drop into the ear, such things as oil of snails, milk of she-wolves, and the like. Throughout the sixteenth century, they made no clear distinction between the different forms of deafness; only Capivaccius suggested that a vibrating iron rod might be used, as we use a tuning fork, to distinguish them. But one great work was taken in hand, the education of deaf-mutes; it was Hieronymus Cardanus, born at Pavia in 1501, who began it; and the Spanish Benedictines took it up, and carried it far and wide over Europe. About this time also came the invention of the aural speculum, which we owe either to Fallopius (1523—1562) or to one of his predecessors.

In the seventeenth century aural surgery made no great advance; for the surgeons were still without instruments, except probes and hooks for foreign bodies. Hildanus wrote on aural polypi; Du Verney refuted the general belief that otorrhœa was a disease of the brain; and Willis noted two very important facts—that loss of the membrana tympani does not of necessity cause complete deafness, and that some deaf people hear better in a noise than in quiet. But, apart from clinical facts, nothing else was discovered—neither better methods of examination nor a more accurate system of pathology. And the general treatment of aural cases in the time of

Harvey was much about the same that they had received in the time of Hippocrates.

The eighteenth century gave us Valsalva, and the invention of the Eustachian catheter, and the first recorded set of operations on the mastoid. Antonine Marie Valsalva published his treatise 'De Aure Humanâ' in 1742; he worked for sixteen years at the anatomy of the ear, and made more than a thousand dissections of it. The accuracy and finality of his work are in strange contrast with the haphazard invention of the Eustachian catheter and the mastoid operation. In 1724 a Frenchman called Guyot, who was not a doctor, but postmaster at Versailles, being troubled with deafness, made for himself a sort of irrigator, a bent tin tube, connected by a leather tube with a pump; he passed the end of this tube into his mouth, and up behind his palate, and thus irrigated the pharyngeal openings of his Eustachian tubes. It is not likely that he really got this instrument into his tubes; but he was sure that it improved his hearing, and he demonstrated his method before the French Academy of Sciences, to their approval. The way of passing the Eustachian catheter, as we have it now, not through the mouth, but through the nose, was invented some years later; and was published in 1741 by Archibald Cleland, an English army surgeon. Then came the inevitable difficulty of finding out what cases needed the catheter; it was tried, of course, on every sort of patients, and few surgeons knew how to pass it, or to recognise the indications for its use; nor was it likely to be useful as an irrigator. At last they discovered that air, not water, should be driven through it; henceforth it was admitted to be of value, but the conditions that required it were still not understood.

In 1774 Petit published a set of cases where he had

trephined the mastoid for the cure of caries of that bone with discharge from the ear. His work was the best thing that had yet been done for aural surgery, full of promise; but, most unhappily, the operation was performed in 1792 on a great Danish surgeon named Bergen, and he died twelve days afterward of acute meningitis. There is reason to believe that in his case the operation was altogether wrong; that he had not caries, only chronic deafness with giddiness and noises in the head, without discharge from the ear; and it is doubtful whether his surgeon so much as opened the mastoid cells. But Bergen died, and the operation fell into bad repute for half a century; and if it was performed for many such cases, we can neither wonder nor regret that it thus disappeared for a time from the field of surgery.

The first year of the present century brought with it the first recorded cases of operation on the membrana tympani. In 1801, Sir Astley Cooper communicated to the Royal Society notes of four cases where he had punctured the membrane for the relief of deafness. It cannot be said that they were such cases as are in most need of this operation. Two of them were chronic catarrh of the middle ear; one was, I think, adenoids; and one was hæmorrhage into the middle ear after injury to the head. Thus paracentesis, right in itself, was set in the wrong light, and the true meaning of it was missed. It came into fashion, and everybody took to doing it; for it was easy, impressive to the patient, and profitable to the surgeon. Sir Astley did it about fifty times, and then gave it up—partly because it failed in many cases that did not require it, partly because so many aural patients came to him that his fame in general surgery was imperilled. The operation was done in an off-hand way on all sorts of patients, including deaf-mutes; anybody could

make a hole in the membrane; and at last paracentesis fell into the hands of quacks, and into disrepute for many years. It would be true, I think, to say that for half a century, from Sir Astley's operations in 1801 to Yearsley's invention of an artificial membrane in 1848—and this also has enriched the quacks—no great advance was made in aural surgery; books were written, and cases were published, but only on the old lines.

Then at last, in 1853, came Sir William Wilde's book, 'Practical Observations on Aural Surgery.' Certainly it was practical; he cleared the air like a storm, denouncing wholesale the ignorance and apathy of the profession. 'Like most students,' he says, 'I was taught, during my apprenticeship, theoretically to believe, and practically to observe, that we know nothing about the diseases of the organ of hearing.' He spoke his mind about the treatment that he knew was given to aural patients—ammonia, turpentine, tincture of cantharides, or acetic ether, dropped into a man's ear without examination of it; garlic, figs, or onions for poultices. Glycerin, which had just been discovered, was held to be a good local remedy for everything, including deaf-mutism. But Wilde did more than clear the air; for he invented the wire snare for the removal of aural polypi, and the free incision down to the bone for acute periostitis of the mastoid.

Still no clear advance had been made in the pathology of aural diseases; there was no complete continuous record of the changes found post-mortem in the ears of deaf people. And this is Toynbee's especial honour, that he refounded aural surgery on pathology. His book was published in 1860: 'The Diseases of the Ear: their Nature, Diagnosis, and Treatment.' He had worked twenty years at it, had made more than two thousand dissections. 'The result of my investigations established

this general fact, that the existence of some of the most important affections of the ear had not even been imagined.' He was the first great pathologist among aural surgeons; and he was the first surgeon to hold, by his appointment to St. Mary's Hospital, a special department for aural patients. His work was undervalued by the chief physicians and surgeons of his time; but it is probable that Toynbee, in pathology, did more for aural surgery than any man before him.

Wilde had advanced along the line of clinical observation; Toynbee had advanced along that of pathology; the third great way of improvement lay in the discovery of better methods of examination. Wilde's book bore the date of 1853; Toynbee's book was in 1860. Between these two dates came the discovery of the laryngoscope, the use of the frontal mirror, and the discovery of posterior rhinoscopy; in 1861 came Brunton's otoscope, in 1862 Politzer's bag, and in 1864 Siegle's speculum. See how swiftly things were moving, now that aural surgery was at last able to advance down all three lines at once. Manuel Garcia, who invented the laryngoscope, is still living; his communication of his discovery was made to the Royal Society on May 24, 1855:

'The method which I have adopted is very simple. It consists in placing a little mirror, fixed on a long handle suitably bent, in the throat of the person experimented on, against the soft palate and uvula. The party ought to turn himself towards the sun, so that the luminous rays, falling on the little mirror, may be reflected in the larynx.'

Thus Garcia had at first no rontal mirror. The picture in Toynbee's book, so late as 1860, shows the surgeon holding the aural speculum with one hand, and in the other a candle with a reflector, something like the candle-lamps that are used for reading in a railway-carriage;

this he holds somewhere between the patient's ear and his own eye. Probably the date of the frontal mirror is 1855, and Von Tröltsch the inventor; but Czermak also invented it, a year or two later, for use with the laryngoscope:

'I very soon recognised, by inventing a new proceeding —artificial light, and the large ophthalmoscope as a reflector—all the practical value of the instrument which I had begun to handle.'

Probably, too, we owe to Czermak the use of the posterior rhinoscope; his paper, 'On the Inspection of the Pharyngo-nasal Vault, and of the Nasal Cavity, by means of Small Mirrors,' bears date August 6, 1859.

There was some opposition made to these new methods; like the stethoscope, so the new aural instruments found men who would not use them. For instance, Kramer of Berlin, who had himself invented the worst aural speculum that was ever made, would have none of them; he called Toynbee a 'miserable aural surgeon,' he said that the use of Politzer's bag was the last resource of incompetent men who could not pass the Eustachian catheter; he would never use a frontal mirror, and if there was not enough sunlight for him to see the membrana tympani, he just sent his patients away. But in spite of such opponents these wonderful years, from 1853 to 1862, did more for aural surgery than all the centuries that had gone before them. One more date should be kept in mind, and that is November 23, 1869, when Wilhelm Meyer of Copenhagen read his paper before the Medico-Chirurgical Society of London, 'On Adenoid Vegetations in the Naso-pharyngeal Cavity.'

We may stop here, for this account of aural surgery is only to show that it advanced along three definite lines of work—clinical, pathological, and technical—and all of

them practical. We must follow the same lines; and our only hope of learning aural surgery is in practical work among out-patients.

The Examination of Aural Cases.

It is a good plan to take the history of these cases in the very words of the patients; to write down what they say, not what we think. Many of them give very exact accounts, and we should listen to them carefully, and see how much we can make out by this method alone, before we examine them. Even a case of wax in the ear can teach us something if we follow this method, diagnosing the case before we examine it, and noting how often we are right, how often wrong. Also we must take into account the patient's age, his occupation, and the duration of his troubles; making no rash promises to patients who are past middle age, and no promises of any kind to very old folk and chronic cases. People come to hospital who have been deaf for a quarter of a century or more; we can no more restore their hearing than we can make them young again. But we can relieve most of them, and make their lives more pleasant; and many of these hopeless cases were not hopeless at first, would not have gone so deaf if they had been properly treated; but they were told they would 'grow out of it,' or were advised 'not to let anybody meddle with their ears'; they belong to the time when aural surgery stood at the level of the domestic remedies of the present day.

To examine the membrana tympani, it will suffice to use an aural speculum and a frontal mirror, having both hands free, one to adjust the patient's head, the other to hold the speculum. The exact make of the speculum is not very important, but the best for general purposes are

of silver or bright metal, having wide mouths and oval tubes; and we must be careful to use a speculum of the right size, and to get a whole flood of light straight on the membrane.

But if we are to get any pleasure out of looking at the membrane, we must have it magnified. Suppose it lay not at the bottom of a blind alley but on the surface, level with the skin; of course we should take a lens to examine it. Here we have a most important structure, of infinite complexity, the whole thing not bigger than one's little finger nail; and even the least changes in it must be noted—changes in colour and curve and texture, some of them due to disease, some consistent with health. The membrana tympani is one of the features of a man's face; and though it lies hidden in a cul-de-sac, happily out of reach of general criticism, yet we are bound to be familiar with it as with his other features. We cannot well get to know it by heart, unless we magnify the image of it. We may do this by just holding a lens in front of the speculum; but the lens must have the right focal length, and even then there is some difficulty with this method, because the surface of the lens catches the light like a mirror. But Brunton's otoscope is a most excellent instrument, throwing a flood of light on the membrane, and giving a well-magnified image. It wants a little practice, but it is far and away the best thing to use; only the specula that go with it must be bright inside, not like frosted silver, as they are sometimes made, but as bright as possible; for the frosted silver lining gives a sort of diffused light on the membrane, which blurs the image of it.

Siegle's speculum, though it is very useful in some cases, does not belong to those instruments that are essential for aural work; because we can observe the

tension of the membrane as well, or almost as well, by getting the patient to blow down hard while we look at it through Brunton's otoscope.

The Eustachian catheter is an instrument that we must have, so soon as we are past the rudiments of aural surgery; but it gives us some trouble before we learn its full value. Since Politzer's bag came into universal use, the catheter has been somewhat neglected; yet it is a better guide in diagnosis, and it sometimes succeeds when the bag fails, and it is more exact and accurate, being adjusted to one side, not acting on both sides at once. Every student should pass it, or have it passed, on himself. It wants plenty of practice, and a very light hand. The essential thing is that the catheter should fit the patient; one catheter will not fit everybody, any more than one pair of boots. We must not go fishing in a large naso-pharynx with a catheter that is too straight, or scraping the sides of a small naso-pharynx with a catheter too much curved; we must bend it this way or that, till it is exactly the right shape.

The best pattern for general use is a short, fine, light, silver, Woakes' catheter, boldly curved. First you rest the end of it just inside the nostril, then you raise your hand and very gently advance it, keeping in touch with the floor of the nose, and edging a little to one side or the other if you feel the way blocked, but never using the least force; then you feel the catheter drop over the soft palate, and come up short against the back wall of the naso-pharynx. Withdraw it a little, turning its point toward the opposite ear, and it will hitch against the posterior border of the septum; then give it a turn downward and outward, and you will feel the soft palate lift it, and will find it lodged in the mouth of the Eustachian tube, looking toward the ear, and refusing to go further.

A catheter that is too much curved will not pass easily through the nose; a catheter that is not curved enough will not hitch fairly against the septum, will not stop in the mouth of the tube; you have to hedge between one curve and another till you fit your patient. Be very careful that the catheter is aseptic, and put a little oil or vaselin on it; keep in touch with the floor of the nose, and go very gently.

Politzer's bag is of course an instrument that we must have; the most useful size is a six-ounce bag, not too large to be held firmly and emptied with a single quick squeeze; with two nozzles, one bulb-shaped for general use, the other pointed to fit the catheter. To use the bag alone, without the catheter, cover the bulb-shaped nozzle with a bit of drainage-tube, and grease it with oil or vaselin. Hold the bag horizontal, level with the floor of the nose, looking straight back, not upward. It is true that the illustration in Politzer's book shows the surgeon pointing the bag upward; but Politzer used a curved nozzle; the blast of air must be kept down at the level of the floor of the nose. Compress one nostril round the nozzle of the bag, close the other nostril, and empty the bag rapidly; but go gently at first, if you are dealing with an acute or subacute case of Eustachian deafness, with earache and tenderness about the ear and throat. We learn by experience what amount of force to use for each case; we are likely at first to use too little, not too much. And the patient should blow his nose before you give him the air-douche, or you will only drive a quantity of mucus back into the naso-pharynx.

To shut off the naso-pharynx, that the air-douche may not go down the patient's throat, he must swallow a mouthful of water (Politzer's method) or slowly say *h-u-k* (Grüber's method). The former is, I think, more

efficacious than the latter method, and makes the patient less ridiculous; but Grüber's method is very useful with children, and with very stupid patients, who, when you say 'swallow,' open their mouths and let the water run out, and then laugh. Sometimes, but not always, very young children may be politzerized with good results while they are crying. With Politzer's method, we empty the bag just as the larynx moves upward in the act of swallowing; with Grüber's method, just before the patient sounds the *k*. Every student should study these methods on himself; especially the feeling when the air-douche is given too soon or too late.

The auscultation-tube is useful if a man will always practise with it; he gets more insight into aural cases; but the exact interpretation of the sounds thus heard is very difficult. The old method of auscultation was simple enough; you just put your ear, or your stethoscope, to the patient's ear, while he blew down or had the air-douche given to him; now we use a flexible tube, leaving both hands free to give the air-douche. The most definite of the auscultation-sounds is the whistling of the air through a small perforation of the membrane; this is unmistakable: you may sometimes hear it, without the auscultation-tube, standing some way from the patient. And it is easy to recognise the soft murmur of the air entering a healthy middle ear through a healthy Eustachian tube; and the silence, in cases where the tube is blocked, or the middle ear hampered with adhesions. But other sounds are hard to interpret; you cannot tell where they come from, or diagnose the case on their evidence. Yet the habitual use of the tube is good practice, because it gives us in the long-run a better understanding of the signs of aural diseases.

For testing a patient's hearing there are three methods:

with the voice, the watch, and the tuning-fork. But a man may hear a whisper better than he hears a watch; there is no equality between the two sounds, no proportionate or regular rate in our failure to catch them; we hear best what we are most accustomed to hear; and a man who hears conversation fairly well may not mind being deaf to a sound so trivial and unpractical as the ticking of a watch.

The tests with the tuning-fork are a more difficult matter; for they do not always give results that fit the other facts of the case, they cannot always be trusted. The most important are Weber's and Rinne's tests, and these every student should practise on himself:

(1) If you hold the fork anywhere on the middle line of the head, on the forehead, or between the teeth, you hear it in both ears alike; the sound is the same through each side of the head. If you then close one ear, you hear it louder in that ear than in the other; you retain some vibrations that escaped while the meatus was open, you direct them back upon the membrane, you increase the resonance of the middle ear; but you do not interfere with the internal ear and the auditory nerve. By closing the meatus, you have in some way altered the conduction of sound; but it is impossible that you should have altered the perception of sound. Therefore, if you have a patient who is deaf in one ear, and you find that the tuning-fork, on the middle of his forehead, is heard louder in the deaf ear, you have reason to think that his deafness is due to some fault in his external or middle ear, not in his internal ear; something gone wrong with the sound-conducting apparatus, not with the sound-perceiving apparatus. That is Weber's test.

(2) If you hold the fork against your mastoid bone, and keep it there till you have ceased to hear it, then hold it

close to your ear, you will hear it again. Put it back on the mastoid, you lose it again, and so on. This is Rinne's test; and when it gives this positive result that you get with a healthy ear—when the conduction of sound through the air works better than the conduction of sound through the bone—then you speak of this result as 'Rinne positive' (Rinne +). Now take this case; a patient is deaf in one or both ears, and he does not hear the tuning-fork well, wherever you may hold it. But, so far as he can still hear anything, he hears better through the natural channel of hearing than through the cranial bones; like you, he hears the tuning-fork close to his ear, after he has ceased to hear it through his mastoid. He is very deaf; but the fault lies not with the sound-conducting apparatus, but with the sound-perceiving apparatus. The sound reaches him best, as it reaches you best, along the ordinary path of hearing; it gets to his auditory nerve all right, but it does no good when it gets there. That is to say, Rinne positive in a case of deafness is evidence that the internal ear is at fault, or the brain; not the external or middle ear. If, on the other hand, Rinne's test gives a negative result (Rinne −), if the patient hears the tuning-fork through his mastoid, after he has ceased to hear it the usual way, then the evidence is on the other side—in favour of some disease of the external or middle ear, not the internal ear.

After all, there is no essential difference between these tests; both alike are to decide whether it is the conduction or the perception of sounds that is at fault. But, as a matter of fact, they sometimes give contradictory answers. McBride goes so far as to say that 'they often yield directly opposite results.' Politzer, who has given an immense amount of study to them, admits that they are not always to be trusted, and are beset with

difficulties. The patient may be unable to observe his own sensations, or to understand what you want. In old people, there is naturally some loss of bone-conduction. Your tuning-fork may be of the wrong pitch; if its note be too high, it will be heard through the air, while you are testing your patient's power of hearing through the bone; if it be too low, your patient will mistake the thrill that he feels through his mastoid for the note that he ought to hear through it. Rinne's test is of very little value in cases of slight deafness: it is often positive, though it ought to be negative, in purulent catarrh of the middle ear with perforation of the membrane; it is sometimes negative in unmistakable cases of disease of the internal ear, though it ought to be positive. The middle ear and the internal ear may both be diseased; and in such cases the tests are indefinite, just when you most want them to be definite. All these sources of error, and more beside, are set forth by Politzer in his account of these tests; therefore they cannot stand alone, they are only one factor in your estimate of a case; and there is a great deal of truth in Steinbrügge's verdict on them:

'We may be permitted to doubt whether all these experiments, though people think so much of them, are any real help toward diagnosis. The difficulties of them seem always on the increase, they take up more and more time, and get more and more complicated, and the exceptions to the rules are for ever being multiplied. And in spite of all the work that has been spent over them, our diagnosis must still rest on the history of the case, on what we can see for ourselves, and on the patient's symptoms; and it is hard enough to do all this, let alone having time to do more.'

But we ought at least to try these tests on ourselves,

to grasp the principle of them—the contrast between air-conduction and bone-conduction, the preponderance of bone-conduction in deafness of the middle ear. A man who habitually uses the tuning-fork becomes observant of many small facts. Take, for instance, one very simple experiment; hold it to your forehead, and lightly close one ear; then, of course, you hear it louder in that ear; but if you press harder on the ear, as hard as you can, you hear it less clearly, and may hear also a ringing noise in your head. You have in some way, by this heavy pressure, interfered with the action of the internal ear; you have produced the signs of increased pressure in the labyrinth, affecting the auditory nerve. And we ought to learn these tests, not because they are infallible, for they are not, but because they teach us to 'look at the case all round,' and give us more insight into the conditions of aural work.

The External Ear.

The old anatomists named every ridge and furrow of the external ear, and all its muscles, and were not concerned with the fact that it is a rudimentary organ. 'The whole external ear may be considered as a rudiment, together with its various folds and prominences, which in the lower animals strengthen and support the ear when erect, without adding much to its weight.' And Mr. Darwin further says that the infolding of the helix has probably come of the whole ear being permanently pressed backward; and that the little prominence on the upper margin of the helix is probably the trace of the pointed ear of some of the lower apes. Look for this token of our arboreal ancestry in yourselves and

in other people, noting especially whether it is the same on both sides; for I have found it, in a left-handed man, well marked on the left ear, but absent from the right.

Again, the external ear is in some inexplicable way related to a man's general cerebral development. In those who are insane it is often ill-shaped and, as it were, unfinished. The usual defect, in such cases, is in the lobule; which is either absent, or continuous with the skin of the face, not properly set out; and this is said to occur in 15 to 20 per cent. of cases of insanity. Again, in habitual criminals the ears are often of a bad shape, standing out like handles from the sides of the head. Professor Lombroso says that 28 per cent. of many thousand criminals whom he examined had these outstanding ears. I have seen a boy whose two ears were wholly unlike; one was shapely and well set back against his head, the other was the typical outstanding ear of the habitual criminal, like the handle of a jug. His mother said that he took after his father's family with one ear, and her family with the other; and she made haste to add that the criminal ear was on the father's side.

Though rudimentary organs are especially liable to variation, yet congenital malformations of the external ear are not common. They show traces of the development of the ear by coalescence of the branchial arches; there is the malformation by defect, the little pit or fistula at the summit of the helix; and the malformation by excess, the supernumerary auricles, auricular appendages; or the whole ear may be fused into a mere shapeless nodule of fibrous tissue. Where the development of the whole external ear is thus arrested, the middle ear and the internal ear are also undeveloped in most cases,

so that nothing can be done; yet one or two cases have been recorded where the tuning-fork and the catheter gave evidence that the sound-perceiving apparatus was fully developed, and that the meatus was blocked by nothing more than a very thin diaphragm or film of tissue.

It does not follow, because the external ear is immovable, that it is useless; and there is, or was, a general belief that it collects the waves of sound and reflects them down to the membrane. Test the validity of this belief on yourselves; fill up the hollows of the ear with wax or putty, taking care not to occlude the meatus: and see if it impairs the acuteness of your hearing. Politzer says that it does; I do not find, in my own case, that it makes any difference; try it on yourselves. Again, try whether you can find any truth in the old theory that different parts of the ear resound to different notes of the octave; that if you gently rub the edge of your helix all round, bit by bit, you hear a regular scale of notes, as though you were touching a keyboard. You hear nothing of the kind; you get the same note everywhere, or rather not a note, but the same friction-sound; but of course it sounds louder and hollower when you rub close to the meatus. Again, a man may lose his ears without evident loss of hearing; for instance, Toynbee had the opportunity of examining a man whose left ear had been cut off for thieving, and he could not find any difference of hearing between the two sides. The external ear is unimportant alike in structure and in function; but it should be studied as Darwin and Laycock and Lombroso have studied it, and from the point of view of the artist.

Miscellaneous injuries of the external ear--cuts, bruises, and so forth—are, I think, slow to heal, as we should

expect from its structure. Of special injuries, three are worth noting here. One is the narrowing of the meatus by dense scar-tissue, after a wound of the ear. I have seen two such cases, where the ear had been almost severed from the head; and in both the scar made a thick ring of hard fibrous tissue, so that the meatus would only just admit a probe. Another is the lacerated wound of the lobule, from the dragging-out of an earring. Another is the hæmatoma auris — more often described than seen—the tense painful hæmorrhage into the tissues of the ear, that was more common in the days of prize-fights, and is also apt to occur among the insane, whose cartilages, like their bones, may become so ill-nourished and degenerate that they bruise or break at a very slight injury, or even without injury. The cicatricial narrowing of the meatus may be left alone, if the scar has come to a standstill, and there is no evident impairment of hearing, and no retention or other trouble beyond the stricture. Or it may be treated by gradual dilatation, or by careful division of the whole ring of scar-tissue; but there is nothing to be gained by any sort of forcible dilatation. The earring wound should be treated like a hare-lip, by refreshing the edges of the cleft, and uniting them with horsehair sutures passed deep into the lobule. The hæmatoma auris requires treatment, because it is apt to leave the ear distorted and thickened; it should be freely incised, the wound kept aseptic, and the ear retained in a good position, carefully padded and bandaged, for a fortnight at least. Even with the best treatment, some deformity is likely to remain.

Of that most common injury, a foreign body in the meatus, note first that nobody has yet explained why children put these things into their ears and noses. It can hardly be for pleasure, or for experiment, or to keep

something that they consider valuable; we do not know why they do it, and they are unable to account for it. Mostly they take bright showy objects, beads or buttons, shiny seeds or shells; but a poor child will be content with a pebble. With adults, the foreign body has got in by chance, or has been put there to ease the earache; it is usually a forgotten plug of cotton-wool, and I have found in one ear four such plugs of different ages, one on top of another; also I have found onion-leaves, tobacco, and dead flies, a husk of seed, and a glove-button that had been there for a quarter of a century.

Never leave a foreign body in the ear; the harder it is to move, the more you are bound to remove it; those that you cannot remove, you must remove. If you cannot do it by careful prolonged syringing, with the child's head laid flat and the ear turned downward, then give chloroform, and try again; never hesitate about giving chloroform; never use hooks and scoops on a struggling child. For instruments, a loop of softish wire is safe enough, but it slips off anything round and smooth: a scoop has this fault, that it does not draw the foreign body straight out, but rather levers it out; and this levering may do harm, or you may get the scoop caught between the foreign body and the wall of the meatus. Probably the best instrument for smooth round bodies is Morse's forceps, the midwifery forceps in miniature; you can pass each blade separately, they take little room, and are well curved for slipping round a bead or a seed without hurting the membrane. If everything fails, then you must detach the auricle behind, work your way down between the cartilaginous meatus and the bone, incise the meatus close to the foreign body, and so reach and remove it, even if you have to chisel away some of the bone to set it free.

The diseases of the external ear are most of them what we should expect from its structure and position. It is one of the extremities of our bodies, exposed in all weathers, so that it is subject to sun-burn and frost-bite, and often suffers in cases of Raynaud's disease. It contains cartilage, and so in gouty people the helix may have urates deposited in it. And it is a meeting-place of skin and mucous membrane, so that syphilitic mucous patches may occur at the opening of the meatus; I have seen them in both forms of syphilis—acquired and inherited. It has, moreover, its full share of the diseases of the skin, and of new growths, both innocent and malignant. Beside all these, the external ear has its own special diseases. There is a peculiar chronic form of inflammation, with pain and swelling, of one or both ears, never extending beyond the ears, lasting many weeks, not influenced by treatment, and apt to recur again and again at long intervals. There are other forms of inflammation that are limited to the meatus: in old people it is sometimes cracked and glazed and excoriated, giving rise to intolerable itching. In children it is subject to impetigo, with free discharge and formation of crusts; and this condition, in many of the children, is due to neglected perforation of the membrane. Again, there is furuncle of the meatus, which is often mistaken for eczema, but is more acute in the onset, with sharp throbbing pain, and tenderness and fulness below the ear or in front of it: but a furuncle of the meatus has not the typical acuminate shape of an ordinary boil, it is a more diffuse swelling of some part of the meatus, usually the floor of it. Or the furuncle may have broken already, and you see only a very small ragged sore, and a little thick blood-stained pus in the meatus.

Beside these inflammatory affections of the meatus,

there are various non-inflammatory troubles that cause partial or complete obstruction. In very old people, the cartilaginous meatus may become shrunken and, as it were, collapsed, so that only a vertical slit is left, which they must keep open by wearing a small tube in it by day. Or the meatus may be blocked by one or more exostoses; but these aural exostoses are rare, and before we can be sure they are present we must convince ourselves with a probe that the smooth rounded swelling seen through the speculum has the absolute unimpressionable hardness of bone, and is neither a polypus, nor a bulging forward of the membrane. For the treatment of exostosis, so long as there is no inflammation of the middle ear, and a chink is still left open for the transmission of sound, we may do well to let it alone, for it may never grow larger; but if we are compelled to remove it, we must be prepared for a very difficult operation.

Finally, there is that most common cause of obstruction, an accumulation of cerumen. You will find that your patients always ask you to tell them the cause of it; they resent it, as though it were due to some want of cleanliness, and expect you to explain why it has occurred. There are at least three theories about it: one, that it comes of some unusual narrowness or crookedness of the meatus; another, that it is due to too much washing and poking of towels into the ear; another, that it is the result of some old forgotten inflammation of the meatus. None of these theories will fit all cases: there is something about it that we do not know. It is common alike among rich and poor, well washed and unwashed, at every age after infancy, in ears of all shapes and sizes. It runs in families, but it does not go with any particular complexion or temperament.

If the plug of cerumen be so fixed and hard that you

cannot move it by syringing, soak it well for ten minutes with a strong solution of bicarbonate of soda, and syringe it again. After it has come away, be sure to examine the ear, to see that none is left behind. Remember that the syringing often causes acute transient congestion of the membrane—dilated capillaries running down the back of the handle of the malleus, like a leash of scarlet threads; or some part of the membrane may be suffused with red. Do not mistake this blushing of the membrane for inflammation. And never take it for granted, when you first see your patient, that the cerumen is the only cause of his deafness; he may be stone-deaf from some older trouble.

Sometimes we find the meatus blocked, not with cerumen, but with masses of epithelial débris, the result of chronic irritation. The epithelial surface of the membrane may be shed like a skin, so that you get a complete cast of the membrane, showing the print of the handle of the malleus. Sometimes, but not often, we find a vegetable parasite—*Aspergillus niger*—growing in the meatus: little jet-black spots and streaks, as though the meatus and the membrane had been splashed with ink. Epithelial débris has a white sodden look, and is easily removed; cerumen varies from yellowish-brown to glossy dark-brown, almost black, and from soft to hard, according to its age. In time it may dilate the bony meatus, may even cause absorption of it here and there; this condition is shown in several specimens in Toynbee's collection in the Hunterian Museum.

The Membrana Tympani.

To get any pleasure out of looking at the membrane, it is absolutely necessary that we should have a good flood of light, and a magnified image; and there is no instrument so good as Brunton's otoscope. If your patient is a small child, set him on your knee; don't let his mother hold him. Find the handle of the malleus—that is your chief landmark, whence you take your bearings; and remember that the membrane is variable, like the other features of men's faces, and no two membranes are exactly alike. There are slight differences of colour and of curve; the handle of the malleus may be more or less straight or curved, long or short, thin or thick; the membrane in old age differs from the membrane in childhood—all within the limits of health. The membrane looks obliquely downward and forward; and in very young children it lies so near the base of the skull that this obliquity is very great, and your view of the membrane is foreshortened. In shape it is convex, but drawn inward near its centre by the handle of the malleus; so that it is concave, with a convex surface. It is set in a ring of bone, but there is a small gap, the incisura Rivini, in the upper part of this ring; here also the fibrous tissue of the membrane is deficient, so that its epithelial covering and the mucous membrane of the middle ear come together, back to back; and this weak spot is called Shrapnell's membrane. The colour of the membrana tympani varies from ivory to grey, and it is lustrous, like a pearl: yet it may look opaque, not from disease, but from slight excess of epithelium; or may have a dotted look, like the stippling of an engraving; or there may be slight congestion of its uppermost portion, or

slight dilatation of the vessels that run along the handle of the malleus, yet no aural trouble of any kind.

Our chief landmark is the handle of the malleus, shining through the membrane as a white or yellow streak passing downward and backward. At the upper anterior part of the handle is the processus brevis, which may look round and smooth, or sharp and pointed, but always definite, clear-cut, and as it were almost coming through the membrane. The lower end of the handle, with the membrane just round it, is called the umbo; and in front of the umbo there is a bright spot of light, where the membrane reflects the light that you throw upon it. Note also the anterior and posterior folds of the upper part of the membrane, where it is drawn tight over the processus brevis; and Shrapnell's membrane, which is just so much of it as lies above the handle of the malleus.

Injuries of the membrane come either from outside or from inside. It may be scratched or punctured by the patient using a toothpick or a hairpin to clean his ear; it may be ruptured by a hard box on the ear, or by the sudden assault of a very loud noise, or an explosion; it may be wounded by the surgeon with a probe or a syringe. Never take a probe to test the tension of the membrane; you must judge of it by some other method. These scratches and ruptures are easily recognised if only you see them at once; the vivid crimson spot or streak, or the multiple points of hæmorrhage close together, or the ragged little slit filled with blood; but it may be hard to say whether the wound goes right through the membrane. Therefore you get the patient to blow his nose hard, while you watch the membrane; you may hear air escaping through it, or may see a faint stir about the edges of the little wound, or some movement of a bubble of fluid in it; these signs make it certain that the

membrane is perforated, even though the patient did not feel at the moment of rupture that sickening pain and sense of an explosion which sometimes attend it.

Or the membrane may be ruptured from inside by violent coughing or sneezing; but this could hardly happen with a perfectly healthy membrane. Slight bleeding from one or both ears often attends such injuries of the head as might cause fracture of the base of the skull; but the diagnosis of fractured base is often made where no fracture exists. A little bleeding from the ear is of itself hardly stronger evidence of fractured base than a little bleeding from the nose. In some of these cases the blood comes from the meatus; in other cases the membrane is torn, and that is all. A patient with a bad head injury generally goes two or three days before his ears are examined; and when you do examine them, you may be unable to find whence the blood came; anyhow, a little bleeding from the ear, not followed by a steady flow of cerebro-spinal fluid, is no sure sign of fracture of the base.

The treatment of all these lacerations of the membrane must follow the usual rules of surgery; you must prevent infection of the little wound and suppuration in the middle ear. Cleanse the meatus well with careful syringing and swabbing with perchloride lotion, dry it thoroughly with tufts of absorbent wool, dust it with boric acid or iodoform, and pack it lightly with gauze. The membrane will soon heal if it be thus treated; but if you leave it to Nature, you may get suppuration in the middle ear.

The diseases of the membrane, apart from middle-ear disease, are of no importance. There is such a thing as primary acute inflammation of the membrane, and of it only—acute myringitis—but it is very rare; so are the

granular or vesicular nodules on its surface, described by Politzer. Calcareous degeneration of the membrane is not rare, and may occur in young people; it has nothing to do with the age of the patient. You may find it either as a brilliant snow-white irregular patch or plâque set in the substance of the membrane, or as a delicate reticulate ring of calcareous deposit round its margin, looking like white lace. Or you may find a round yellowish patch of thickened membrane, due to fatty degeneration.

But practically the membrane is part of the middle ear, with no diseases of its own. Hitherto we have been outside the real difficulties of aural surgery; for the injuries and the diseases of the external ear most of them require very little skill either for diagnosis or for treatment. Now we begin to get out of our depth; and our one hope of understanding the middle ear is to see things for ourselves. It is impossible to make any strict classification of its diseases; they run into each other, and into the diseases of the internal ear; they cover three-fourths of the whole field of aural surgery; and are all centred in a structure of infinite complexity, hidden out of sight, and not so large as the tip of your little finger. We cannot arrange them within definite limits, unless we prefer classifications to facts. I can only suggest three headings that may for practical purposes be useful:

1. Acute inflammation of the middle ear, and its consequences.
2. 'Chronic catarrh' of the middle ear, and its consequences.
3. Adhesions in the middle ear, and their consequences.

But there is no accurate division to be made between these different states of the middle ear; and practical work among out-patients is the only way to learn anything about them.

Acute Inflammation of the Middle Ear.

The essential feature of acute otitis media is infection of the middle ear by streptococcus, staphylococcus, or pneumococcus. Among predisposing causes are such injuries as exposure to a cold wind, or long immersion in a swimming-bath, and such obstruction of the Eustachian tube as occurs in children with adenoids; and it is common not only in measles, diphtheria, scarlet fever, and influenza, but also in typhoid fever. Pain is the first sign that the ear has been infected—sudden throbbing pain, that keeps the patient awake at night; and deafness, which comes suddenly, like the pain; and the patient is feverish, 'queer all over, bodily ill,' shivering and depressed. Or things may be even worse; the pain may become frightfully intense, there may be delirium, rigors, high fever, and prostration; but at least there will be pain, deafness, and feverishness, all sudden and all well marked.

The membrane, being one side of the middle ear, suffers with it; first there is acute congestion of a part of it, or of its whole area; then, in a day or two, there is fluid behind it. You are not likely to see the whole membrane pressed forward; but some one part of it is advanced in front of the rest, and this bulging portion of the membrane may have a distinct yellowish hue. You cannot be sure of the nature of the fluid; it may be serous, or sero-purulent, or purulent; but in cases of scarlet fever, measles, or diphtheria, it is likely to be purulent, and in all cases where the pain and the fever are severe, with rigors, great pain and tenderness of the mastoid, rapid yielding of the membrane, and a yellowish or brownish tint behind it. But the exact character of the fluid is of no great importance, so long as we diagnose the case at once,

and treat it at once. The chief difficulty is with children too young to describe their suffering, lest we mistake it for acute meningitis. Watch for the least signs of aural disease—the child putting its hand up to its ear, or lying always on one side, or flinching from light pressure over the mastoid; examine the membrane in every acute illness with cerebral symptoms; never let the possibility of acute otitis go altogether out of your thoughts.

For treatment, there is puncture of the membrane; and here we must be guided not by any preconceived idea that there is pus behind it, but by the aspect of the membrane, and the general condition of the patient. If he remains seriously ill, after twenty-four or thirty-six hours' treatment, and there is distinct bulging of the membrane, then we must puncture it; and every man in practice should be prepared to do paracentesis, just as he is prepared to do tracheotomy. It is easy enough, if only we anæsthetize the patient; but without a general anæsthetic not even the most liberal use of cocain will prevent it from being painful to the patient, and therefore difficult for the surgeon. Practise it, through a speculum, on a piece of writing-paper: get a good flood of light, a speculum of the right size, and a perfectly sharp knife—a tenotomy knife will answer the purpose—note where the membrane is most prominent, be sure that your knife does go through it, and just enlarge your puncture a little as you withdraw your knife; and look to be rewarded by the appearance of a drop or two of fluid. If it does not come at once, yet it may come in a few hours. The pain is immediately relieved in most cases; but sometimes, and especially in acute otitis from influenza, it lasts for some hours, even for two or three days, in spite of successful puncture. Treat the little wound

carefully; and remember that you may have to repeat the operation.

But some of the less severe cases get well without the membrane being punctured either by the surgeon or by Nature. Put the patient to bed, keep him on low diet, give him calomel or senna, and a really efficient narcotic, that you can trust—not such drugs as sulphonal and paraldehyde. Lay a long wick of absorbent wool in the meatus, wet with a solution of cocain, not less than 10 per cent., which will both ease the pain and reduce the inflammation; and cover the whole ear, and all the skin round it, with a hot fomentation. You will find it an excellent plan to apply one or more leeches over the mastoid, according to the age and strength of the patient. If all these things, after a fair trial of them, fail, and the membrane is still thrust forward by the fluid behind it, then give an anæsthetic, and puncture it.

Often, as in the case of children with adenoids, we may cut short an attack of earache by the timely use of Politzer's bag. For a moment you may increase the pain, and the child will break out crying, and clap his hand to his ear; then the pain and deafness will become less.

Subacute otitis and recurrent otitis are what their names imply—less pain, and less fever, and a better chance of recovery without perforation. And there are cases of acute otitis, both in children and in adults, which must be called acute, because the fluid is purulent and the membrane is rapidly perforated; yet without much pain or fever. But in nine cases out of ten the patient is in great distress, feverish and wretched, unable to sleep, with rapid throbbing pain and sudden deafness. We cannot fail to note these signs, yet we may mistake the cause of his suffering, and go after acute meningitis or typhoid. Keep the possibility of acute otitis always in

your thoughts, diagnose the case early, and follow a very active treatment.

'Chronic Catarrh' of the Middle Ear.

We cannot get rid of this phrase, 'catarrh of the middle ear'; yet it is vague and inaccurate, and we can hardly give it a fixed meaning. It is vague, because it covers a whole host of cases, ranging from the least occasional dulness of hearing to hopeless deafness; and inaccurate, because the word 'catarrh' implies the presence of fluid, but in most of these cases, when you see them, it is conspicuous by its absence; you see, not the disease, but its results, the harm it has done. The disease itself is closely related to acute otitis, but its results may be just like those of chronic progressive deafness. Therefore we have no distinct image of all these cases; and it would be simpler to give up the word 'catarrh' altogether, and to use the more popular name 'throat-deafness.'

Take the instance of a child with adenoids. He is rather deaf, but not always deaf; he hears better some times than others, or he may hear well enough at home, but his teacher complains of him at school; 'the least cold that he has, it flies straight to his ears,' and he often has the earache. Or take the case of an adult patient with chronic post-nasal catarrh; he begins by telling you that he is 'never free from a cold in his head,' and that 'the phlegm keeps coming down from the back of his nose,' and he goes on to say that he has an occasional stuffiness, or a slight pain, in one or both ears. Probably he has got some trick of relieving himself, by pressing on his tragus, or by blowing his nose hard; and then he hears something crack, or feels something give way, and for a time his hearing is improved.

These two cases may serve to show the sort of throat-

influences that are at work to produce 'chronic catarrh' of the middle ear. And now comes the point that I want to make. Not one case in fifty, when you see them, has any collection of fluid in the middle ear. There was fluid, there must have been fluid; but you never, so to speak, come upon the catarrh *flagrante delicto;* you see only the results of it. You expect to see mucus accumulated behind the membrane, altering its level as the patient alters his position, and forming bubbles when you blow air into it with a Politzer's bag, and so forth; and you see nothing of the kind; not the disease, but the harm it has done.

And what are these results? The middle ear is a small closed air-chamber, with one ventilating-shaft, the Eustachian tube. If the tube be blocked by adenoids, or post-nasal catarrh, or any like swelling, the balance of forces in the middle ear is disturbed. At first, and afterward at odd times, it is the mucous membrane that most resents the change: you get congestion, you get catarrh. But this is a transient affection, soon past; the mucus, save in rare cases, soon drains away, and you just miss seeing it. And what you do see—if I may so put it—is not the presence of fluid, but the absence of air. Take the membrane in any case of adenoids; it is retracted, cupped, thrust inward by the pressure of the atmosphere unopposed by any corresponding outward pressure of air within the middle ear. It may be slack or rigid, free or adherent; anyhow, it has gone inward. The bright spot of light is shifted or lost; the handle of the malleus is carried backward, foreshortened, almost horizontal; the processus brevis is tilted forward, so that it looks as if it were jumping through the membrane; and this straining of the membrane over the processus brevis brings out the anterior and posterior folds in strong relief. Dark shadows

lie here and there on the membrane, especially in front of the handle of the malleus, and below the folds; and you may see, through the membrane, the long process of the incus, or some part of the inner wall of the middle ear.

All these changes are the slow work of atmospheric pressure, unbalanced by a proper supply of air behind the membrane; and the membrane was the more easily thrust inward, because it was already weakened by old catarrhal inflammation. Get by heart this picture of the retracted membrane—not disease, but the results of disease—and remember that it all began in the naso-pharynx, in 'throat-deafness.' Therefore your treatment must follow suit; take the case in hand at once, open up the Eustachian tube with the catheter, or with Politzer's bag, and keep it open; examine the patient for adenoids, post-nasal catarrh, polypi, enlargement of the inferior turbinates, hypertrophy or atrophy of the nasal mucous membrane, and chronic pharyngitis; get him into good condition, and teach him to take care of himself.

What amount of success do we attain with these patients? That depends mostly on the age of the patient, and on the duration of his troubles. The deafness and earaches that come of adenoids depart so soon as the adenoids are removed, unless there be some further obstruction; the subacute intermittent stuffiness and slight earaches of young adults with hypertrophic nasal or post-nasal catarrh are generally cured, or at least improved, by treatment; and in all cases, so long as the membrane is only relaxed, not adherent, and Politzer's bag gives marked relief from deafness, we may hope to do good. But we must not be too hopeful; we must make a difference between children and adults; and again between patients who have present active naso-pharyngeal troubles, and patients whose troubles have done their

worst and come to an end, so that nothing can be gained by treatment of the naso-pharynx. Above all, we must draw a hard and fast line between those cases that are recent and those that are old. It is impossible for a cavity so small as the middle ear, and a film of tissue so thin as the membrane, to suffer repeated attacks of catarrhal inflammation and be none the worse for them.

Slowly the membrane loses its fineness of texture and adjustment, it doesn't catch sounds well, it gets set and warped, one part drawn and rigid, another slack or sacculated. Bands of cicatricial tissue form round the malleus or elsewhere, thin white streaks crossing and recrossing the membrane; the ossicles settle down in a sort of subluxation, working at a disadvantage; and so at last the whole middle ear gets hampered and half spoiled with adhesions. Simple chronic catarrh, left to itself, thus tends to drift toward severe deafness, and many patients, when they first seek advice, are already far gone that way; their membranes and their middle ears are almost wrecked. Get such a patient to blow his nose hard, while you watch his membrane; it will not move at all, or one part of it will move too much, will come flapping forward like a loose sail caught by the wind, and he will hear better for a few minutes, and nothing more. That is the last stage of chronic catarrh; or things may be even worse, and the growth of adhesions may have upset the equilibrium of the inner ear.

Therefore take these cases early; don't leave children to grow out of enlarged tonsils and adenoids; don't neglect post-nasal catarrh and other naso-pharyngeal troubles. In spite of treatment, many of these patients will remain slightly deaf in one or both ears, now better, now worse, with some trick for the temporary relief of their deafness; and many of them, probably 10 or 15 per

cent., will become always deaf. You must work away at every case, clearing the naso-pharynx, keeping the Eustachian tubes open, and teaching the patient to take care of himself.

'Chronic Progressive Deafness.'

Among aural patients there are some—and they are usually middle-aged or old—who give the following account of themselves: 'I've been a little short of hearing for a long time, but it has got worse lately. I used to hear very well when I was young; I never had an earache, or any discharge from the ear. I'm not subject to colds in the head, or sore throat. I have no pain in the ears; both ears are deaf, and I don't hear better at one time than I do at another; and I don't find any improvement after blowing my nose. The deafness came quite of itself, and so slowly that I hardly noticed it; but it gets worse as I get older, and when I sit at table I can't catch what is going on round me. But I shouldn't mind the deafness so much; what I come for is the noises in my head; and sometimes I feel quite giddy and dazed, as though I should fall.'

Note that the patient is passing or past middle age; that the deafness is bilateral, painless, unvarying, slow, not associated with any affection of the throat; and he would put up with the deafness, but cannot stand the noises in his head. That is all you will get out of him, except that he may tell you he suffers from gout or rheumatism. His membranes may look fairly healthy, and, if you use Politzer's bag or the catheter, you find no obstruction of the Eustachian tube; air enters the middle ear, but it makes no difference to him. Therefore you are dealing with a case distinct in many ways from cases of chronic catarrh, which is a throat-deafness, an affec-

tion of early life, intermittent, variable, often unilateral, painful at times, improved by treatment; but this 'chronic progressive deafness' is a primary ear disease, an affection of later life, unvarying, painless, bilateral and incurable. Yet cases of chronic catarrh may come at last to be almost as bad as cases of chronic progressive deafness—the same irremediable difficulty of hearing, the same noises in the head, the same confused feeling of giddiness; because in both alike the ossicles have become stiffened and adherent, and the stapes has got fixed by adhesions to the fenestra ovalis, so that the pressure of the labyrinthine fluid is increased, and the auditory nerve is 'jangled out of tune.' Happily, most of them stop short of this last stage of their troubles; and remain deaf, but nothing worse.

These noises in the head, or tinnitus, are excellent things to study; for they illustrate the whole scheme of aural diseases, all the way from the external ear to the auditory centres in the brain. A hard plug of wax, pressing the membrane inward, may cause tinnitus; and you can produce this sort of tinnitus in yourselves by pushing the tragus hard down over the meatus; or the membrane may be thrust inward by increased atmospheric pressure, as happens to men who go down in diving-bells or work in caissons. Again, there is no sort of middle-ear disease that may not be accompanied by noises in the head. Again, tinnitus may be due to some alteration in the blood-supply of the inner ear; thus it often comes of the use of quinine, because this drug causes hyperæmia both of the middle ear and of the inner ear; or while one is going under ether; or from loss of blood; and it is especially common among nervous anæmic women, and nursing mothers. Or it may have its origin within the brain, as in those cases where it

follows a cerebral hæmorrhage; or it may be set going by some time of great mental distress or sudden shock. And so we pass upward to the auditory auræ of epileptic patients, and to hallucinations of hearing, and other things outside aural surgery.

Always pay attention to the account that the patient gives you of these noises in his head. Sir William Wilde, half a century ago, said that patients with tinnitus are apt to hear those noises that are most familiar to them; that country people say they hear birds singing, or bees humming, or water running; artisans say they hear hammers and saws; and old women say they hear tea-kettles boiling. I do not believe this is true; but, if a patient gives a very exact description of the noises in his head, that is a bad sign. The favourable cases are those where the patient simply says he has a ringing or buzzing in one or both ears. But if he gives you an elaborate account of it, and says it is exactly like birds, or church-bells, or exactly like this or that series of sounds, it is not a favourable case. Noises that are definite, complex, musical, or articulate, are of worse import than a simple hissing or humming; and the sound of the pulse thumping in the ears is also unfavourable. I suppose the more complex sounds betoken some cerebral change, and may, perhaps, be reckoned half-way toward real hallucinations of hearing; anyhow, they are not likely to be cured by treatment.

If we set aside those cases of tinnitus that are cured by the removal of wax, or by the use of Politzer's bag, we are left with a set of cases which must be 'looked at all round.' Some of them want not bromide of potassium, but iron and strychnia; some want more food, wine, and a holiday. Bromide of potassium is valuable for those who are worried, overworked, watchful over themselves;

it is useless for the old people who have had the same noise going on for a quarter of a century. The dilute hydrobromic acid is perhaps better than the bromide of potassium; and either drug must be given in full doses, and for several weeks. If they fail, no other sedative is likely to succeed.

The giddiness or vertigo of middle-ear disease is not so common as the tinnitus, and not often severe; and I think that the administration of the bromides has no effect on it. In many cases it is not a real loss of equilibrium, but rather a sort of confusion and uncertainty, which a man must feel who is very deaf and troubled with constant tinnitus; he cannot walk in a crowded street without being dazed. Remember that these cases of middle-ear disease, with tinnitus and giddiness, are not Menière's disease: that name should be kept for a true primary affection of the inner ear.

What can we hope to do for these cases? We have to deal with a deep hidden cavity, full of minute structures, all bound down by adhesions. Politzer's bag, and the catheter, and drugs and blisters, have all failed: can we gain anything by any operation on the middle ear? Some of these patients are in a very miserable condition. Take the case of a nervous, hard-worked man or woman, past middle age, tormented by constant tinnitus and by the fear of going stone-deaf. They lose their nerve; they are waked in the night by the noises in their heads; they cry when they talk of their sufferings, and are afraid they will become insane, or commit suicide; and some of them do. 'It isn't the deafness,' they say; 'I could stand the deafness; what I can't stand is the noises in my head.' Happily, these worst cases are not common. If I were thus afflicted, I should have an incision made in my membrane, to relieve the inner ear

from pressure; and when this relief ceased, as it soon would, I should perhaps submit to some further operation. But these operations are not free from danger, and their value is not yet decided. You will find a minute account of them in Dench's work on the Diseases of the Ear, and Mr. Arthur Cheatle has published a summary of the evidence for and against them in the *Practitioner*, May, 1897.

Among these cases of chronic middle-ear deafness are some who hear better in a noise than in quiet. The patient tells you that he can hardly catch what is said to him in a room, he cannot follow conversation round a dinner-table; but when he is in a vehement rattling noise, as in an omnibus or a train, he hears every word without difficulty; he may even hear better, at such a time, than those who are with him. This curious power of hearing in a noise, which is a bad sign, showing that the ossicles are hampered by adhesions, was first described by Thomas Willis more than two hundred years ago:

'There is a certain sort of deafness, wherein the patients appear to have lost all sense of hearing, yet so long as some mighty noise is raging round their ears, as of cannon, or bells, or a soldier's drum, they hear distinctly the talk of the bystanders, and give a right answer to all questions; then, so soon as the horrid tumult ceases, forthwith they fall deaf again. I have been told by a trustworthy gentleman of a gentlewoman who, though she was deaf, yet so long as a drum was beat within the room she heard plainly all that was said to her; wherefore her husband hired a drummer for a domestic servant, by whose assistance he might sometimes have talk with his wife.'

That is Willis' account of the condition which is called by his name, paracousis Willisii, or Willis' contrariness of hearing. It goes with fixation of the ossicles, with adhesions in the middle ear; therefore it is an unfavourable sign, alike in cases of chronic middle-ear catarrh

and in cases of chronic progressive deafness of elderly people. Perhaps the vibration of a loud noise somehow stirs the stiff ossicles into action, so that sounds reach the patient which otherwise he would not hear; perhaps the auditory nerve filaments, or the auditory centres in the brain, are stimulated, so that they become able to disentangle the sounds from the noise. We may compare with this condition the exaggerated sense of hearing in some patients when you remove a plug of cerumen from the ear; for a few minutes, voices sound louder than they really are, and have a metallic or ringing tone.

Perforation of the Membrane.

Acute or subacute inflammation of the middle ear is one of the diseases that hospital patients leave to Nature, especially when it attacks not themselves, but their children. Then they bring them with a profuse fœtid discharge from one or both ears, and say, 'It began with the earache, but I didn't bring him when he had the earache, because I thought it was only his teeth.' You ask what they did for the earache, and you are told that they bathed the ear with warm water, or used a bread poultice, or camphorated oil; or they say, 'Oh, I didn't do anything for the earache; I thought it was only the earache.' You might have done so much for the child, with Politzer's bag, cocain, hot fomentations, paracentesis of the membrane, and a drop or two of laudanum; you might have averted perforation; but it was 'only the earache,' and Nature was left to puncture the membrane after her own fashion.

Perforation is, of course, not the bursting of a healthy membrane by mere weight or tension of fluid behind it, but the softening of an infected membrane, so that it

gives way like the skin over a pointing abscess; therefore a perforation, which was at first very small, may spread rapidly till a large part of the membrane has been destroyed: you may watch the melting of its margin; or two perforations may run together; or you may see, in rare cases, a regular chain of small perforations, round the circumference of the membrane, all run together, so that the greater part of it perishes; you cannot at first tell how much will be lost.

Among the signs of perforation, we have the sudden relief from pain; the patient is rid at once of the intolerable pain and throbbing in his ear, he drops off to sleep, and wakes less feverish and almost comfortable. But there are cases of acute otitis that are not markedly painful; and there are cases where the pain does not at once subside after perforation, but lasts for one or two days longer; which happens chiefly in acute otitis due to influenza. In one case of this kind, lately under my care, the pain in the ear and in the mastoid region lasted for two days after perforation; and the patient was conscious of throbbing in the ear for two or three weeks after it.

We ought always to examine what comes away when we irrigate the ear. If the lotion brings with it little gritty lumps of fœtid caseous débris, not only the first time you syringe the ear, but day after day, you know that there is an accumulation of hardened pus and epithelial cells in the middle ear, and the perforation will not close till this has been removed. If you wash out a long shred of flocculent lymph, a sort of false membrane, which sticks and clings to everything, and is slowly loosened and floated away in the lotion, you know that the perforation is not likely to be healing. If the lotion comes back just tinged with blood. it is probable that there are granulations blocking the way; or you may

loosen a large granulation by syringing, so that it comes away with the lotion.

The passage of lotion down the Eustachian tube into the pharynx, though it is a sure sign of perforation, tells us nothing about the size of the perforation or its chances of healing; it may happen with a small perforation, and not with a large one. In a few cases, with patients who retract the palate against the back of the pharynx when you syringe the ear, you get the lotion dropping from the nose, not passing down the throat.

A recent perforation may be hard to see, even though it be large, because the whole membrane is still inflamed; your landmarks are obliterated, there is no contrast of colour between the perforation and the rest of the membrane. Especially with small children it is always hard, and sometimes impossible, to see a perforation; because the meatus is so narrow, and the membrane is set so obliquely, close to the base of the skull, that you cannot get a good view of it. In these difficult cases, remember that a drop of lotion is often left hanging in the perforation, so that it catches the light, and you see a bright spot of light moving up and down, or from side to side, keeping time with the pulsation of the vessels of the middle ear. You can time it with your finger on the patient's wrist; and this dancing spot of light is a sure sign of perforation, very useful when the patient is a small child.

As for the general character of perforations, they are of regular outline, round or oval, seldom narrow or slit-shaped; for they come not from rupture, but from acute softening of an infected membrane. Any part of it may be perforated; but Shrapnell's membrane, for its size, gets more than its share, and this because of its relation to the attic behind it. Multiple perforations are very rare;

you may see two, or even three, perforations of one membrane, but not of the same date; one attack of acute otitis ends, almost invariably, in one perforation. In size they range from a mere pin-hole up to the destruction of the whole membrane, all but its extreme edge; or the handle of the malleus may be left hanging in space, so that the outline of the gap has the shape of a kidney, the malleus making the hilus. As for the colour of a perforation, remember that you are looking through it into the middle ear. If you look through a window into a room, it depends on the brightness of the day, and the size of the window, how much you see of the room; a small window on a dull day will look all dark; a large window on a bright day will let you see the colour of the wall-paper and the outlines of the furniture. So a very small perforation will seem only a dark spot on the membrane; but a large opening, with a good light, lets you see the vivid red surface of the back wall of the middle ear; you may even make out some part of the furniture, such as the stapes, or a part of the incus, or the fenestra rotunda.

But in practice what we want to know is not the shape or size of a perforation, but its chance of healing. Under favourable circumstances, a small perforation may really close again; you may watch it growing smaller and smaller, with a delicate white ring of healing epithelium round it, such as you get round a healthy ulcer; and so it will continue closing till it has healed, with barely the trace of a scar. Or a perforation may heal by the growth of a very thin film of cicatricial tissue across it, like darning a hole in a stocking: this delicate scar tissue is at first bright and transparent, like gauze, shifting outward when the patient forces air into his middle ear, and inward when he swallows; and it may either remain free and non-adherent for the rest of his life, or may become

adherent to the back-wall of the middle ear. In the latter case, you cannot always tell whether you are looking at the result of perforation or at the result of chronic catarrh, at an adherent cicatrix or a cicatricial adhesion; nor does it matter which you call it.

Or a perforation may fail to close, yet its margin may heal; the middle ear is perfectly healthy; now and again, at long intervals, there may be a slight catarrh, a few drops of non-purulent fluid, and that is all; there is no disease, and no fear of disease, nothing but a small hole in a healthy membrane, with a healthy middle ear beyond. That is what we call an obsolete perforation. Even a very large perforation may heal after this fashion, though it has destroyed a half or two-thirds of the membrane, or all but the margin of it; yet in time the whole region may level up, and be skinned over with scar-tissue and epithelium, so that you look straight into the middle ear, or the remains of it, all banked up safe with fibrous tissue.

An obsolete perforation, since it is only a minute opening through a healthy membrane into a healthy middle ear, has no importance of any kind; you may find it by chance, and the patient may fail to remember anything about it; and an obsolete perforation of Shrapnell's membrane is one of the commonest sights of aural surgery. This sort of perforation matters nothing, so long as the middle ear is healthy, and the hearing unimpaired; only one should be careful, in bathing, not to dive, or to let water remain in the middle ear, or to let a cold wind blow upon it. In a case of perforation what concerns us is the state of the middle ear; we want to know, not the size and shape of the window, but what is happening inside the room.

Chronic fœtid otorrhœa, so common in hospital work,

is due for the most part to neglect; our hospital patients either do nothing for it, or they use a small syringe and some warm water, and then keep the pus pent up behind a plug of wool; they make no attempt to disinfect the middle ear, soon get tired of taking care of themselves, and let the disease drift.*

You have to disinfect and keep clean a septic cavity in the petrous bone, which cannot close, and can only drain haphazard through a small hole in a rigid membrane. You may begin with perchloride lotion, three or four syringefuls three or four times a day; but if the meatus is inflamed or tender, you ought to use only boracic lotion.

* The following printed rules are given to the aural out-patients at the Middlesex Hospital:

RULES FOR SYRINGING THE EARS.

1. A patient cannot well syringe his own ears; it should be done for him by another person.

2. If he must do it for himself, it is best to use an indiarubber ball-syringe; if it is done for him, it is best to use a glass syringe, about eight inches long, with a straight nozzle. The ear should be drawn outward, and the nozzle of the syringe should be put just inside the narrow passage of the ear, and directed a little forward.

3. Three syringefuls at least should be used each time. The first syringefuls may be of plain warm water; the last syringeful must be of lotion, mixed with an equal quantity of warm water.

4. After syringing, the ear must be very carefully dried with tufts of cotton-wool twisted up tight to a fine point, and passed well down into the ear. Several tufts must be used each time, so that the ear is made perfectly dry.

5. After the ear has been thoroughly dried, it must be well dusted inside with the powder. The best way is: Take up a few grains of the powder in a quill, or in a little tube of paper, and blow them deep into the ear.

6. The syringing, drying, and powdering should be done three times a day, unless otherwise directed. Wool should not be kept in the ears, unless directed.

There is no great virtue in syringing, if you leave the ear sopped with lotion; you must dry it very carefully with fine twisted pledgets of absorbent wool, using plenty of them, till they come back perfectly dry. Finally, you must blow a few grains of boric acid powder, or boric acid and iodoform, deep down into the ear, and must let the air have free access to it; you want to dry the mucous membrane, and to keep it dry. If you do all this, or rather if you teach some friend of the patient to do it for him, punctually and thoroughly, day after day, perhaps for a month or six weeks, you will get most of these perforations to heal; but you must not make rash promises about the final amount of hearing power.

Or the way may be blocked by granulation tissue or by a polypus. The growth of granulation tissue in these cases ranges from a single very small granulation, just inside the perforation, to a crowd of them filling the whole field; and these may be vascular, friable, sensitive, bleeding at a touch, and of a vivid crimson tint; or pale, indolent, œdematous, and fœtid. Such masses of exuberant tissue are sometimes called polypoid granulations or multiple polypi; but it is best to keep the term 'aural polypus' for a single pedunculated fibrous or myxomatous new growth, of considerable size, arising from the submucous tissue of the middle ear after suppuration, advancing along the meatus, and at last visible at the entrance of it.

For the treatment of granulations, the mere cleansing and drying of the ear may have a wonderful effect upon them. Or they may shrink and disappear after the use of absolute alcohol, a few drops daily in the ear. If this fails, you must use caustics—chromic acid, or chloracetic acid, or the galvano-cautery—or a forceps, or a curette; but strong caustics must not be applied at random to

tissues still acutely inflamed, only to granulations that are chronic, indolent, and painless.

For true aural polypus there is only one treatment. You had better give an anæsthetic*; and the proper instrument for removing the growth is Wilde's snare, with a fine steel wire, what they call piano wire. Edge your loop well down over the growth till you are sure that you have got a good hold of it; then slowly tighten your loop, and slowly turn the snare round and round, not pulling, but twisting only, and the whole mass will come away. But if you tighten your loop too soon, you will only cut the top off it. And though you remove the whole growth, you must watch for recurrence, and may have to touch the stump once, or more than once, with chromic acid or the galvano-cautery. Remember that there is free bleeding when the growth is removed; and that the stump is left soaking in pus. It is therefore best to plug the ear with wool, for a few hours only, and then to set to work disinfecting the middle ear.

Cases of chronic suppuration in the middle ear are sometimes called tubercular on insufficient evidence. Especially with perforations of Shrapnell's membrane, we are too ready to say that they are due to tubercular disease. They have got a bad name, which they do not deserve. It is true that the attic behind Shrapnell's membrane has but the thinnest shell of bone for a roof, and then come the dura mater and the temporo-sphenoidal lobe; it is true also that cerebral abscess, nine times out of ten, is due to suppuration in the middle ear, boring through the roof of the attic. But for one perforation of

* Nitrous oxide will suffice; and the pain of the removal without anæsthesia is less than the pain of the removal of a tooth. Only go to work slowly; and you may have to make several complete turns of the instrument before the growth comes away.

Shrapnell's membrane that we find unhealed, we find thirty healed or obsolete — find them by chance, in patients who come for some other aural trouble. That a discharge from the ear may end in cerebral or cerebellar abscess, or in septic meningitis, or in septic phlebitis of the lateral sinus, holds good for all cases of discharge from the ear, and has nothing to do with the site or size of the perforation. Of course, if a perforation of Shrapnell's membrane refuses to heal, and is blocked with granulation tissue, or there is a persistent purulent discharge from it, mixed with fœtid caseous débris, then we have reason to be very anxious about the case, and to advise operation; obstinate suppuration in the attic cannot be free from risk. But the great majority of cases of this perforation get well quickly, and remain healed, and the hearing is hardly impaired.

Mastoid Disease.

The magnificent work now done in cerebral surgery, and the gains won on this field, must be studied in the writings of the men who won them. And there are other operations which belong to aural surgery, but not to the elements of it, and therefore need not be described here. But a man may have to open the mastoid antrum, or to scrape out a sinus or a chronic abscess of the mastoid cells, as a matter of necessity; and he ought to be able to open the antrum, just as he is able to perform tracheotomy.

Mastoid disease, for practical purposes, may be put under three heads:

1. Periostitis.
2. Pus in the mastoid antrum.
3. Sinus, or chronic abscess, in the mastoid cells.

These three conditions of the mastoid are all of them secondary to middle-ear disease; true primary disease of the mastoid is so rare that it need not be taken into account here.

Periostitis of the mastoid, and subperiosteal mastoid abscess, may be compared with ordinary alveolar abscess from a carious tooth. In both cases alike, free incision through the soft tissues may suffice; but of course, in both cases, the bone is infected from within; you do not disinfect the bone by incising the tissues over it; and many patients who have been treated by simple incision down to the mastoid heal well, but come back afterward with disease of the bone. Probably, if you traced a large number of cases thus treated, you would find that the great majority of them had relapsed. Still, you are not justified in opening the mastoid in every case of periostitis; you must act according to what you find. You may even get the periostitis to subside without incision, by means of leeches and hot fomentations; but in most cases you will fail, or the inflammation will return; and then, 'if you cut at all, cut all'; go right down to the bone the whole length of your incision. Usually there is so great infiltration of the soft parts that the external ear is thrust outward, downward, and forward, and the hollow behind it is obliterated; you may have to cut nearly an inch deep before you get to the bone. You may find it bare of periosteum over a wide area of its surface, with an abscess of considerable size between the periosteum and the bone; or there may be small pockets of pus burrowing here and there in the cellular tissue; or there may be dense œdematous infiltration of the soft parts, but not suppuration. In every case go right down to the bone, feel your knife grating on it; the bleeding will soon stop, and the wound must of course be left open.

You are not bound, in every case of mastoid periostitis, to interfere with the bone; yet, if you carefully examine it where it is bare, you are likely to find a sinus in it. There may even be a wide opening in it; but this is not so common as a narrow sinus, just admitting a probe, filled and blocked with firm, dark granulations; and I think it always lies higher than you would expect, well above and behind the meatus. Or you may find, not an open sinus, but a spot where the bone is somewhat soft, rough, and discoloured. Or, if the patient be a small child, the whole mastoid, all but its shell, may perish *en bloc*, being unable to make a stand against the onset of infection from the middle ear. It all gives way at once, and there is nothing left but a cup of bone containing a sequestrum soaked in pus.

Next to these cases comes chronic abscess of the mastoid—the slow accumulation of caseous matter within the shell of the bone. It is, I believe, in all cases a tubercular disease; and it occurs almost invariably in older children or young adults. You have a history of long-continued discharge from the ear, constant or intermittent, with attacks of pain, tenderness, redness, and swelling of the mastoid; the patient has been for years now better, now worse, feverish during the attacks, and always 'delicate'; probably you get some history of consumption in his family; the mastoid in most cases bears the scars of old suppuration, and is in all cases enlarged. You expose it by free incision, find an obsolete sinus, or break through a thin shell of bone, and go straight into a large smooth round cavity, packed with fœtid stuff like putty or cream-cheese; the quantity of half-solid caseous matter thus encysted in a dilated mastoid may be very large, the whole bone distended with it, so that your probe goes a long way into the

patient's head. You may find a sequestrum in the cavity, or you may not. In every case, except those few cases of acute periostitis or acute subperiosteal abscess where you may be justified in leaving the bone alone, you must deal freely with any sinus, soft spot, or chronic abscess; you cannot get into any trouble or difficulty if you open the bone downward and forward from the sinus, not upward or backward.

In contrast to chronic mastoid abscess, take the signs of acute abscess in the antrum, by extension from the middle ear. The patient has been attacked by acute otitis media, soon followed by perforation, but without evident relief; he remains feverish and in pain, still showing symptoms of septic absorption in spite of the discharge from his ear. The local signs—the pain, tenderness, and swelling—may not be well marked, yet you feel sure he has some fresh source of infection in him. Or a patient, who has for some long time had a discharge from the ear, begins to complain of throbbing pain deep in the bone, but from his history and from the signs of the case it is not a chronic abscess of the mastoid. Of course, when you first see the patient, the disease may have gone already beyond the bone to the dura mater, the brain, or the lateral sinus; and in any complete account of aural surgery it would be wrong to set cases of antral suppuration apart from cases of intra-cranial infection. But this further advance you may hope, by opening the antrum, to prevent.

The difficulties that arise over this operation are mostly of our own making, because we have attacked the mastoid too high up or too far back. Nature has given us a good landmark, the suprameatal triangle, MacEwen's triangle; bounded above by the root of the zygomatic process, in front by the posterior superior quadrant of the bony

meatus, and behind by a line joining these two lines. Keep below the zygoma, above the centre of the meatus, and in the front half of the mastoid. If you go higher, you may get into the middle cerebral fossa; if further back, you may expose or wound the lateral sinus; if lower, you may open the mastoid cells, not the antrum. Use neither a gimlet nor a trephine; one is too small, the other too large. Use a proper mastoid chisel, go inward and a little forward, neither upward nor backward, and you will find the antrum at the depth of a quarter or a third of an inch through MacEwen's triangle. Do not go behind a vertical line drawn down the middle of the mastoid; and do not use a trephine for this or any other mastoid operation. Remember, in all these operations, that the cavity in the bone is very slow to fill up; the soft parts will heal, in a few days, right up to the edge of it, but you will have to keep the bone-cavity packed with gauze, it may be for many weeks. Remember also, when you scrape a sinus or open a chronic abscess in the bone, to make careful search for a sequestrum; you may fail to find it at first, and then at last come on it lying loose, a little fragment of cancellous tissue, at the bottom of the cavity.

The Internal Ear.

To understand the diseases of the ear, from the internal ear to the auditory centres, we must compare them with the like diseases of the eye. Hyperæmia of the retina, retinal hæmorrhage, retinitis, optic neuritis, perversion or loss of vision from injury or disease of the brain, all have their counterparts somewhere along the auditory tract, in allied conditions of the paths of sound; and what used to be called 'nerve-deafness' is a structural change—no more 'functional' than a broken leg. In every case of deafness, if the external ear and the

middle ear are healthy, be sure there is some structural disease beyond them; and never forget that it is likely to be syphilitic.

But take first some instances of 'nerve-deafness' that have nothing to do with syphilis. A man may suffer fracture of the base of the skull and recover, yet remain irremediably deaf on one side. I remember a case of this kind, where the fracture was at once followed by deafness on the left side; many years later, the deafness was still absolute; there was no sign of middle-ear disease, no tinnitus, no giddiness; it was as though the auditory nerve had been torn across.

Or take, for another sort of 'nerve-deafness,' a case of boiler-maker's deafness — a riveter, who has to work inside a boiler, hammering rivets all day into the roaring, vibrating metal cylinder all round him. Talk to one of these men, and he will tell you that a lot of his mates go deaf in time, with loud ringing noises in the head. One man told me that as many as fifty per cent. among riveters suffer this way. At first, the deafness and tinnitus stop when the patient knocks off work, or if he gets a week's holiday; but at last they become permanent. Years ago, it was thought that boiler-maker's deafness was a disease of the middle ear; and of course it may occur in a man who also has middle-ear disease; but it is a true degeneration, from overstimulation or exhaustion of the auditory nerve.

Or take Menière's disease. In 1861, Menière published a short account—only two or three pages long—of the following case: A young girl was exposed, during menstruation, to a severe chill. She became suddenly deaf in both ears, with intense giddiness and intractable vomiting, and in a few days she died. The post-mortem examination failed to explain her death. The brain and the cord

appeared healthy; the semicircular canals of each ear were filled with a reddish, fibrinous exudation spreading into the vestibule. From this one case, and from the records of a few cases something like it, Menière drew the picture of a distinct acute disease, having these symptoms, sudden deafness, giddiness, tinnitus and vomiting; and, as the cause of them, hæmorrhage or sudden fibrinous exudation into the labyrinths. That, and nothing else, is Menière's disease; and we must not give the name to any acute or chronic affection of the middle ear.

But the most common cause of 'nerve-deafness' is chronic inflammatory thickening or interstitial exudation into the labyrinth, or at the base of the brain; and the most familiar instance of this condition is the irremediable deafness of syphilitic children. Other fevers, beside syphilis—which is 'a fever cooled and slowed by time'—may set up inflammation of the labyrinth, notably typhoid fever, and of course meningitis. Or we may be unable to say what is the exact extent of the damage done along the auditory tract, yet feel sure that the internal ear has had a share of it; as in some cases of deafness after mumps, scarlet fever, or influenza.

With small children, in whom the parts are so minute and delicate, it would be strange if we could say exactly what has happened. A child three or four years old is brought to you, with no history except that he 'cut his teeth on the cross,' or with convulsions, or that he had a slight running at the ears for a few days when he was a baby, or after one of the fevers. He seems wholly deaf, save to such explosive noises as the banging of a door or the clapping of your hands; you can hardly see his membranes, and it is no good testing him with a tuning-fork. He has come to a standstill in his talking; his repertory is half a dozen words that he

learned long ago; and now his mother says, 'Will he grow out of it, or is he deaf and dumb?' If you wish to grasp the whole pathology of the diseases of the ear, begin by getting a clear idea of deaf-mutism. It is put last in all accounts of aural surgery; but it might well come first, because it covers, one way or another, the whole length of the auditory apparatus, from the external ear up to the auditory centres in the brain.

There are two sorts of deaf-mutes: those who were born deaf and dumb, and those, more numerous, who became deaf before they had learned to talk, and therefore are dumb. The congenital form of deaf-mutism may be 'in the family'; it may be transmitted direct from the parent to the child, or it may appear suddenly in a family who have been free from it for many generations, or it may arise in a family who have no history of it in their ancestry. Politzer gives the instance of a family of ten children, four of whom were deaf-mutes; their parents were healthy. Kramer instances a family of six sons and five daughters; the parents were healthy, so were the daughters; the sons were all deaf-mutes. In another family, though the parents were healthy, and there was no family history of deaf-mutism, eight of ten children were deaf-mutes.

Thus it is 'in the family': but what is it, that is in the family? To answer this question, Holger-Mygind some years ago tabulated the records of 118 dissections of the ears in cases of deaf-mutism. In those who had been born deaf and dumb, the following abnormalities were found:

'Obliteration of the meatus, obliteration or imperfect development of the middle ear, defect or deformity of the fenestra ovalis or the fenestra rotunda, blocking of the fenestra rotunda with ankylosis of the stapes, imperfect

development of the labyrinth, changes in the middle ear and the labyrinth from intra-uterine inflammation, abnormalities of the central nervous system, intra-uterine meningitis, hydrocephalus.'

Congenital deaf-mutism, then, is evidence of some definite structural defect in the auditory tract, due either to arrest of development, or to congenital malformation, or to intra-uterine inflammation. Of these defects, some may be the direct reproduction of like defects in the parents; some, the results of intra-uterine inflammation, may be the work of parents tainted with syphilis or alcoholism. Then there is the general belief that consanguinity of the parents tends to produce in the children deaf-mutism — that is to say, some structural change that makes them deaf-mutes. But here authorities differ; one denies the fact altogether, another found that 6 per cent. of the deaf-mutes whom he examined came of consanguineous parents, another found 8 per cent., another 25 per cent. Anyhow, these figures are useless, for they take no account of the multitudes of children who are not deaf-mutes, though their parents are consanguineous. Probably the danger of congenital deaf-mutism is not in isolated marriages of cousins, but in the intermarriage of generations, the breeding in and in of families and clans. In districts where goître is endemic, and cretinism, there deaf-mutism is most common; it haunts remote communities, out-of-the-way places where everybody is related to everybody else; the 'village idiot' is the type. In the Netherlands, for instance, the proportion of deaf-mutes is less than 4 to every 10,000 inhabitants, but in Switzerland it is 24·5 per 10,000.

Acquired deaf-mutism, which is more common, has nothing to do with heredity or development; the patient

is mute because he became deaf before he had learned to talk. It is frightfully common: the child is bright and quick in his movements, sharp and intelligent even beyond his age; he can say a few words, what all babies are taught, and there he stops. His mother emphasizes the fact that he is a very clever child, and 'understands everything you show him,' and she is sure that he hears very loud noises, such as the door banging. But you test him, and find him impenetrably deaf to all ordinary sounds; he had some acute illness in infancy—meningitis, or acute otitis from a fever; he lost his hearing before he had found his speech, and since he no longer hears what people say, he does not try to imitate them. The defects found post-mortem in the ears of patients who had suffered this acquired form of deaf-mutism were as follows:

'Closure of the meatus from cicatricial contraction, loss of the ossicles from suppuration in the middle ear, ankylosis of the ossicles, obliteration of the middle ear by adhesions, caries of the labyrinth, inflammatory changes in the labyrinth, inflammatory thickening of the auditory nerve, and other changes due to meningitis.'

I have seen two or three cases where the loss of hearing occurred, not in infancy, but in later childhood: the child had learned to talk, but no care was taken to keep what he had learned; so soon as he became deaf, people left off talking to him, and he to them; he could make his wants understood, and that was enough for him; and at last his speech, uncorrected by them, and unheeded by him, relapsed into a broken, half-intelligible jargon, the words all clipped and run together. The same sort of process is at work in the harsh, monotonous voices of old folk who are very deaf; but in these other cases there was a slow extinction of speech till nothing was left but sounds.

Therefore the phrase 'acquired deaf-mutism' is inexact, because a child may acquire deafness that is almost impenetrable, yet may be saved from being mute; it depends on his age, and on the amount of care that is given to him. Something might have been saved from the wreck of his hearing; or, if it is too late for that, something may still be done to keep his speech from going to pieces. One or two cases, not more, have been recorded where children, after years of hopeless deafness, have recovered some power of hearing; but this is so improbable in any case of this kind that we must not expect it, and the best thing is to ensure that the child shall be taught lip-reading.

The Upper Air-passages.

Among aural out-patients, there come many cases of nasal or naso-pharyngeal disease; and if these notes are to show to any student the value of work in an aural department, they must make mention of the cases that he will be sure to see there, and afterward in practice.

The upper air-passages, including the Eustachian tubes and the middle ear, are one continuous suite of small cavities and passages, lined throughout with vascular sensitive membrane, occupied by various thin shells and scrolls of bone, and communicating with accessory sinuses. The mucous membrane is adjusted to many different uses: one part of it is covered with ciliated epithelium; another serves to spread out the terminal filaments of the olfactory nerves; another contains true erectile tissue. This wide area of mucous membrane, extended over many square inches, is exposed to every sort of infection, and in every sort of weather; and its diseases are so common that we are bound to study them.

To get any pleasure out of it, you must have the help of a good light and the right sort of instruments, using in every case a very bright lamp, and a frontal mirror with a central opening. You can make a nasal speculum for yourselves, after Mr. Cresswell Baber's method, with a couple of bent hairpins, one at each end of a band of elastic webbing; but it is better to have either Fränkel's or Thudichum's speculum. The former is more comfortable for the patient, but does not hold itself in position; the latter is less expensive, and holds itself in position, but is not quite so comfortable for the patient. Duplay's speculum is not so good as either of them; it admits less light, you cannot so well work through it, and it does not hold itself in position. For posterior rhinoscopy, it is not absolutely necessary to have a rhinoscopic mirror moving on a hinge; you can manage with an ordinary laryngeal mirror of small size, if you bend the shank a little backward and set the mirror a little forward.

Through the nostrils, we see the septum, the floor of the nose, the inferior turbinates, and a glimpse of the middle turbinates; by posterior rhinoscopy, the posterior border of the septum, the posterior nares, all the turbinates, the openings of the Eustachian tubes, and the general shape of the naso-pharynx; and we may be sure of seeing the back of the soft palate; it gets in the way like the epiglottis when we first use the laryngoscope, and the difficulty is to see past it. For posterior rhinoscopy, sit a little lower than your patient, and let him hold his head a little forward and breathe only through his nose; don't draw the tongue forward, but keep it down with a spatula; don't expect to see everything at once, but try first to see the posterior border of the septum, which is the best landmark; then shift the mirror a little, and look to this and

that side of the septum. Cocain or eucain is useful in some cases, but not in all; or you may be able to draw forward the palate with a retractor, but this is easier said than done. With patients who have narrow jaws, and no room to spare, and a nervous twitching palate that cannot bear to be touched, you will not see anything.

Make your examination after a fixed method; first the outline of the bones, their shape and size, then the colour and texture of the mucous membrane, the presence or absence of any discharge or foul smell, the signs of any disease or new growth. With small children, never forget that there may be a foreign body up the nose. Suspect it in every child who has a sore nose with a thick discharge from it, even though his mother tells you that the discharge comes from both nostrils alike; cleanse the nose carefully, and throw a good flood of light into it, and if you cannot see a foreign body, make gentle examination with a fine probe. Never hesitate to give chloroform in these cases; and never attempt to push a foreign body backward into the naso-pharynx.

That very common trouble, deviation of the septum, may be studied in every form and every degree in the aural department of a hospital. Deviations of the septum are not all due to injury: the least disproportion or inequality in the rate of growth of the facial bones may tell on the septum, if there be the slightest extra pressure put upon it by the bones that are articulated with it. The base of the skull may come a little low, or the roof of the mouth a little high, and so the septum may get bowed or S-shaped; or its lower border, where it joins the hard palate, may be sprung or shifted a little this side or that. The formation of a spur or ridge along

one surface of the septum may be due to this extra pressure during growth, or may be the result of injury. There is also a curious localized overgrowth of the cartilage of the septum, the anterior lower angle of it projecting as a little nodular cartilaginous tumour just inside one nostril—I have seen this in children only—and it should be removed, because it is unsightly and apt to get sore. But with regard to deviation of the septum, and spurs and ridges on it, we must recognize the fact that the septum, like the rest of our features, is seldom faultless; and so long as a deviate septum gives no definite trouble we ought not to interfere. If it keeps up an unhealthy condition of the mucous membrane, or is associated with the very least outward deformity of the nose, then we ought to do something for it; the deviation should be corrected with special instruments, the spur or ridge should be thinned down.

Abscess of the septum, or rather hæmatoma with suppuration, can hardly be called a common disease—I have seen only two or three cases—but it must not be overlooked. It is in most instances, probably in all, the result of an injury, but not always the immediate result. The patient complains of pain and obstruction on one or both sides of the nose, and you find on one or both sides of the septum a smooth, soft, rounded, elastic swelling; it is not a deviation of the septum, for both sides may be alike convex; or if the convexity be of one side only, yet there is no answering concavity of the other side; and it is not hypertrophy of the mucous membrane, for it is painful and tender, and fluctuates. The blood thus gathered under the mucous membrane, and passing from one side to the other through some crack or spot of absorption in the cartilage, is apt to break down, giving rise to abscess of the septum. The

treatment is free incision through the mucous membrane; and one incision may suffice, though the fluid be on both sides of the septum.

Perforation of the septum, a much more common condition, is often the cause of great misery, because the patient believes that his nose will certainly fall in, and that the mark of syphilis will be on him till he dies. But perforation of the cartilaginous septum is mostly due, not to syphilis, but to the infection of tubercle or typhoid; and a small perforation of the cartilaginous septum does not cause the least outward deformity of the nose. One look at a skull will show you that a little obsolete hole in the cartilage, such as you may find by chance in a patient who does not know it is there, cannot undermine the bony framework of the nose; even a large perforation, limited to the cartilage, will not visibly deform the nose, or at the worst will cause only a slight transverse wrinkling across the lower part of it. But with caries or necrosis of the vomer, as in tertiary or inherited syphilis, there may be a complete falling in of the bridge of the nose, impossible to prevent, and in most cases impossible to remedy by any subsequent operation.

The Nasal Mucous Membrane.

The word 'rhinitis' has lately been made to do duty for various inflammatory states of the mucous membrane of the nose; but, so far as it is a word at all, it is an adjective, not a noun, and does not imply inflammation, but only means nasal. We should say in full ἡ ῥινῖτις νόσος, the disease of the nose. Of these various inflammations, the most common is of course simple acute catarrh, coryza, the ordinary cold in the head. For the treatment of it, the insufflation of any sort of powder or snuff is almost useless; you want a more diffusible substance,

such as smelling-salts, or a sedative inhalation, or a warm alkaline spray; or you may imitate that popular remedy, the 'carbolic smoke-ball,' by adding a little carbolic acid and oil of lavender to ordinary smelling-salts. And if the patient must be tided over the necessity of speaking or singing in public, let him try thoroughly irrigating the nasal passages with a warm alkaline lotion, and then spraying them with a weak solution of cocain.

Chronic congestion and thickening of the mucous membrane—chronic hypertrophic rhinitis—is a common trouble in early adult life, but rare in later life. The patient gives this account of himself; 'I'm never free from a cold in my head, one cold after another. I can't breathe properly through my nose, and I snore at nights, and wake with a foul taste in my mouth.' His voice is somewhat weak and dull, without resonance; he complains of dryness and tickling at the back of the throat, of occasional slight earache, or deafness, or stuffiness in the ears, and of phlegm coming down from the back of his nose into his throat. The nasal mucous membrane is high-coloured, swollen, but nowhere ulcerated; and you see thick mucus in threads and masses clinging to the walls of the nose and the naso-pharynx. Or this chronic hypertrophic change may be well marked in the naso-pharynx only, not in the nose; and to this form of the complaint, which is especially common in the United States, the name 'post-nasal catarrh' has been given.

It is hard to say what are the conditions that bring about and keep up this chronic hypertrophic catarrh. It is found alike among rich and poor. I do not believe it has any connection either with gout or with any special state of the nervous system; but it is, I think, most often found in those who have narrow nostrils, and had adenoids in childhood; more common among men than

among women; and so far subject to the influence of the nervous system that it is often associated with transient swelling of the erectile tissue of the inferior turbinates. This curious enlargement of one or both turbinates may be the dominant feature of the case; either the whole structure may be swelled, or its posterior end may be seen, by posterior rhinoscopy, projecting into the naso-pharynx, a greyish rounded mass like a nasal polypus. But this condition of the turbinates is not transient in all cases alike; in some it comes and goes in a few hours; in some it is rather a permanent hypertrophy than a simple dilatation of erectile tissue. In the latter case the application of cocain will make little or no difference; in the former it will bring down the swelling in two or three minutes.

Patients with chronic hypertrophic catarrh outlive it more than they are cured of it; they are now better, now worse; they improve under treatment and then relapse; and the majority of them do not take much thought about it, and manage fairly well for themselves. I do not think that drugs are of any use, except to improve their general health; and the best thing is to teach them to cleanse the mucous membrane, once or twice or three times a day, with an alkaline spray, or by the more homely method of snuffing warm salt solution up the nose. In the more severe cases, very good results are obtained by the light use of the galvano-cautery, for a few times only, at long intervals. This method is especially valuable for the enlargement of the turbinates. In a few cases, redundant polypoid growths of mucous membrane must be removed, and this is done best with a galvanic snare; but I have not yet seen a case of hypertrophic catarrh which would justify the removal of the turbinate *en masse*. You must teach the patient to manage his own case;

and to this, in some cases, you must add light cauterization of the mucous membrane, or removal of some redundant fringe or outgrowth of it.

Atrophy of the mucous membrane—chronic atrophic rhinitis, ozæna—is a very different disease; easy to recognize, but hard to explain. There is more room than there should be, not less, in the nasal passages; the nostrils wide open, the turbinates shrunk, the whole mucous membrane not thickened, but thinned and wasted, dry, glazed, cicatricial, greyish or purplish, with stray capillary vessels marked on it here and there, such as come on all scar-tissue. Some parts of it may be worse than the rest, but at last the whole surface may become affected; the wasted patches break down and ulcerate, dark scabs and crusts adhere to them, and when you remove these you find ulceration beneath, and they soon form again. In bad cases the smell is intolerable; and such patients find their life a burden to them, because they cannot get work, or keep it when they have got it, and people will not stop in the room with them.

Many explanations have been given of ozæna; (1) that it is due to necrosis in the ethmoid bone; (2) that it is a primary disease of the glands of the mucous membrane, an invasion of them by a special putrefactive organism; (3) that it is a final stage of chronic hypertrophic catarrh, atrophy of the mucous membrane and its glands consequent on hypertrophy; (4) that it occurs in those only to whom Nature has given nostrils and nasal passages unusually wide and open, so that the mucous membrane becomes dry and shrunk from mere over-exposure to the air. But these explanations must all be brought into line with the fact that ozæna is a disease of one time of life and one sex; it is hardly to be found except in women during early adult life; and we cannot understand it on

any theory that puts this fact in the background. It is a local disease; but there may be a predisposing cause for it in some general change at puberty.

Some other disease of the nasal passages may be mistaken for ozæna; the foul smell may come from dead bone, or a collection of pus in one of the accessory sinuses; make sure that the disease is on both sides alike, that there is no dead bone, no foreign body, no abscess of the antrum; that the mucous membrane is the seat of the disease. And, for its treatment, get the patient to give one hour a day to it, for a month or six weeks, fifteen minutes four times a day. First teach her to use a nasal douche, holding her head forward and downward over a basin, and her mouth wide open, breathing slowly and steadily through her mouth, using a syphon douche with a fall of three or four feet, so that the stream is strong enough to run in at one nostril, round behind the palate, and out at the other nostril; let her now and again reverse the course of it, and make sure that she gets it to go right round. The lotion should be warm, a pint and a half or a quart each time; a simple salt solution will do very well, or Sanitas or Condy's lotion. After the douche, she should dry the nasal passages as well as she can, with tufts of absorbent wool, and blow into them, with an insufflator, a little boric powder. At night she should try closing the nostrils with pledgets of wool, for this exclusion of the air tends to improve the blood-supply of the mucous membrane. She should take iron, cod-liver-oil, and plenty of food. The douche will at least abolish the foul smell of the disease, and, after the first few days, when the crusts have come away, she may not need to use it so often. For the further treatment of severe cases, you must lightly sear the mucous membrane with the galvano-

cautery, which may be useful in three ways: either to promote the healing of a patch of ulceration, or to stimulate some part that is not ulcerated, or finally to reduce the mucous membrane to a mere film of scar tissue, devoid of glands, and therefore not harbouring putrefactive organisms. Another method has lately been employed with good results, the forcible scrubbing or 'massage' of the mucous membrane, under a general anæsthetic, with tightly twisted pledgets of wool fixed on a long probe driven by a rotatory engine. In out-patient work, you seldom see cases of ozæna to the end; but the disease tends, very slowly, toward a natural cure, for you do not find it among those who are middle-aged or old.

Tubercular ulceration of the mucous membrane, though it is not common, may be noted here, as mention has been made of it in relation to perforation of the septum. Its usual place is on one side of the cartilaginous septum, one or more small, rounded, clean-cut ulcers, yellowish, smooth-edged, and indolent. The diagnosis must be confirmed by microscopical examination; and since the disease tends toward perforation, it must receive treatment at once with the curette or the galvano-cautery.

Nasal polypi, though they are so common, are hard to understand. There is no evidence that they are due to chronic hypertrophic catarrh; nor is it easy to see, if they are, how a catarrhal inflammation can produce a series of new growths. They grow neither from the septum nor from the inferior turbinates, but only from the intricate cancellous tissue of the upper nasal cavities, soft glistening white or grey pendulous swellings, like hydatids, ranging from a mere fringe of œdematous mucous membrane to a crowd of growths blocking and distending the whole nose, even invading the frontal sinuses and exposing the patient to the risk of septic

meningitis; but in most cases we find not more than one or two polypi, presenting in the middle nasal fossa, and moving up and down with respiration. For their removal, the galvanic snare is the best instrument; the forceps causes both pain and bleeding, and so does the cold snare. The little fringes of growth, if they require treatment, must be touched with the galvano-cautery. Remember to warn the patient that recurrence is to be expected; it cannot, I think, be hindered by any sort of astringent powder or lotion.

Adenoids.

For digital examination of the naso-pharynx, the patient should sit with the head forward and the mouth wide open, and should breathe through his nose. Pass your finger slowly backward till you have got well behind the soft palate, feeling your way very gently, taking care not to thrust it backward, but to edge your finger up behind it; then find the posterior border of the septum, which is your landmark, and feels like the back of a knife-blade; then the posterior nares, and the openings of the Eustachian tubes. The Eustachian cushions, the raised edges of the tubes, are firm to the touch, and easily recognized; and in small children they are especially prominent in proportion to the size of the naso-pharynx, seeming almost to block it up. In the ordinary rapid examination, you do not feel the posterior ends of the lower turbinates; but you may be just able to touch them, and make out any enlargement of them. This digital examination is very unpleasant for the patient: therefore, in the case of children who have all the signs of adenoids, I sometimes do not examine them till they are under chloroform for the operation.

Adenoids are a good example how things may be overlooked. Men had been at work age after age, all the

great anatomists and surgeons, making innumerable observations and dissections, each of them keen to get ahead of the rest by discovering something. It was not the want of anæsthetics, or of antiseptics, or of instruments, that kept them back: they had only to feel behind the soft palate, and they would have found what they wanted; but they did not. When Wilhelm Meyer, on November 23, 1869, read his paper before the Medico-Chirurgical Society of London, on Adenoid Vegetations in the Naso-Pharyngeal Cavity, he said: 'So far as I have been able to ascertain, we only possess the description of five cases of diseases of the naso-pharyngeal cavity which could be interpreted as cases of adenoid vegetations.' Voltolini had just published two cases, which he had treated with the galvano-cautery; Löwenberg had published three cases. Meyer set to work, and in a year and a half he got 102 cases, all of them in private practice. His account of the discovery is worth reading. He had been treating a young girl for nasal obstruction and chronic hypertrophic catarrh, and had of course failed to cure her:

'I had cleared the obstructed passage through the nose, removed the enlarged tonsils, and the swelling of the throat and soft palate, but the manner of speaking remained as deficient as ever. The patient, a young lady, now underwent a regular course of training in pronunciation, but with no better result. She then came to me again. Having found (posterior) rhinoscopy impracticable, I now passed my fore-finger behind the soft palate up into the so-called "naso-pharyngeal cavity," and was very much astonished to find this almost entirely filled up by *soft masses*, which, giving way to the finger, felt very much like a bunch of earthworms, and, hanging down from the roof of the pharynx, completely closed up the posterior nares. These growths were quite new to me then, and I found no allusion made to them in any of the ancient or modern works on surgery and morbid anatomy which I consulted.'

Things have changed since 1869, and the signs of adenoids are now a matter of common knowledge. But adenoids do not all feel alike to the touch ; certainly they do not all feel 'like a varicocele' or 'like a bag of earth-worms.' They range from very soft, friable, vascular tissue, almost granulation tissue, to firm, tough masses of growth as hard as an old enlarged tonsil. You may be told it is a sign of adenoids, that your finger comes back with a stain of blood on it: so it may, but it ought not. You might as well say it is a sign of stricture, if the catheter comes back with a stain of blood on it. In very young children, they are soft and velvety, and in older children and adults they are firm and dense. You put your finger up the naso-pharynx, and find it obstructed ; you feel for the septum, and cannot come down clearly on the whole length of it ; you can't move freely—the space is narrowed where the tip of your finger ought to go easily.

Adenoids may be present, and may cause inflammation of the middle ear, in children who yet have not the ordinary signs of them, and are quick and sharp, not listless or stupid. But in the great majority the features of the case are well marked : the open mouth, the feeble chin, the nose narrow from disuse, the want of colour and expression. The children are languid, subject to frontal headaches ; they make a noise over their food, and snore and choke in their sleep ; and they are more apt than other children to wet the bed at night, and to have night-terrors. Also they are subject to earaches, and to intermittent deafness ; they have a peculiar thick way of talking, and in most of them the fauces are narrow and pale, the roof of the mouth is high-pitched, and the soft palate slow in its movements. Some adenoids are of a tubercular nature—that is to say, the bacillus of tubercle has been found in the fragments of the growth, in about

eight or ten per cent. of the cases—and it is probable that the tuberculous cervical glands of children are some of them due to infection from tuberculous adenoids. In adults, adenoids are rare; but I have found them in a man forty or more years old, and I know of a case where the patient was over sixty, but was at once cured of deafness by the removal of a considerable mass.

If a child has adenoids, and nothing is done for his relief, he outgrows them. The naso-pharynx goes on growing, and the adenoids do not; there comes a time when a continuous current of air passes over them, the vessels and absorbents of the naso-pharynx act more freely, the adenoids shrink and give no further trouble; and the child helps to bring about his own improvement by learning to keep his mouth shut, which he does so soon as he realizes that he looks ugly with it open.

Yet they may leave their mark on him; he is likely to grow up with an ill-shaped mouth, narrow jaws, and a feeble chin—what Falstaff said to Prince Hal: 'a foolish hanging of thy nether lip'—probably with a tendency toward chronic hypertrophic catarrh, and some old trouble in one or both ears: and he may still go with his mouth open, and snore at night. So it is no real objection to the operation for adenoids, that if you leave them alone the children will outgrow them.

But the operation is not wholly free from danger. I have heard of six cases where it was followed by death; we must not take it lightly. I have had no case of death after it, but in one case the child was in great danger, because he had not been properly prepared for the operation; he vomited during it, and the vomited matter almost choked him. One child had pneumonia a few days after the operation, one had a cervical abscess, and two had acute otitis. I cannot remember any other unfavourable

results, out of a very large number of cases; but we must face the fact that the operation has sometimes been fatal, and that these children died at once, in a few minutes, of an operation that was not absolutely necessary, and was perhaps represented to their parents as absolutely trivial.

What are the opportunities for death in this operation? First, the hæmorrhage. I know of a case where the blood got into the trachea, and the child died then and there; and of another, where the child lost so much blood that he sank and died in a few days. Next, the risk of broncho-pneumonia after the operation; and this may come, not of the passage of blood into the trachea, but as the result of subjecting a small child to the shock of anæsthesia, operation, and loss of blood, and then sending it out at once, perhaps into the rain or the fog, back to such food and nursing as it may get in a London slum. Next, infection of the raw surface of the wound; and here the surgeon may at least hope that he was not the source of infection; but we know that nothing is so likely to infect the child as a curette or a finger not carefully cleansed. Next, the risk of the anæsthetic.

Seeing this dark side of the picture, we may do well to observe the following rules, or something like them:

1. Never operate on a child under three years old.

2. Never operate unless the adenoids give rise to very definite trouble, or the obstruction is so great as to threaten to impair the child's health, his hearing, or his good looks.

3. Let the child be properly prepared for operation; let his stomach be empty, but do not keep him starved for many hours.

4. Make careful inquiry whether he is a bleeder.

5. Keep him in bed, or indoors, for three or four days at least after the operation. Unhappily, this is not possible in hospital practice.

6. Never operate on a child that is evidently weak and unhealthy, unless you believe that the adenoids are the cause of his loss of health. And in such a case do all that you can to improve his general condition before you operate.

These rules are at least not unreasonable; but it is sometimes necessary to operate on children under three years old. I have never operated without chloroform, or in a few cases nitrous oxide; and no more chloroform should be given than just keeps the child quiet for two or three minutes. The position of the child is a matter of some importance—shall he lie on his back, or on his side, or with his head hanging over the end of the table? This last position certainly prevents all risk of the blood getting into the air-passages, but it does increase the hæmorrhage. Moreover, you may find some difficulty in operating on a child thus inverted; the head is not kept quite still, and you do not work in a straight line with it, but as it were in a curve. What you want is to have the child's head fixed, and to know exactly where your instrument is working; and if a man operates quickly, and is well accustomed to the operation, the child is perfectly safe lying on his back, with a narrow pillow just under his neck; this position keeps his head still, you see what you are doing, you feel where you are going. But the instant your instrument is out of his mouth, turn him at once on his side, rolling him well over both by his shoulders and by his hips, raise his head, and clear the blood out of his nose and mouth; don't keep him on his back while you feel with your finger for any unremoved remnants of the growth. And if you are not accustomed to the operation, you had better put him on his side for it, not on his back.

Next, what is the best instrument—the forceps, the curette, or the artificial nail? One must be better than

another. I think that the forceps, in skilled hands, comes to be the best instrument, the neatest, and certainly the most saving of blood. But the rapid and accurate use of the forceps requires a great deal of practice; and any other method of using it either fails to remove all the growth, or may injure the soft palate or the septum. The artificial nail, though it is used by some of our best surgeons, is yet an imperfect instrument, not steady, not properly shaped; its cutting edge looks forward, not downward, comes behind the tip of the finger, not level with it. For your earlier cases, use the curette; leave the forceps till you have thoroughly learned the curette. It has been evolved out of less successful shapes; it has a sharp cutting edge, looking vertically downward, a large loop to encircle the growth, and a slight curve adapted to the curve of the vault of the naso-pharynx. Pass it up behind the palate till you have got well up into the vault, and feel the blunt back of the blade hitched against the posterior border of the septum. Make sure that you are in the middle line, and that you command the whole depth of the naso-pharynx. Then put steady pressure on the curette, holding it with your fist, not like a pen; and go firmly down over the adenoids, keeping close to the back of the naso-pharynx, and feeling and hearing them crunch as you cut through them. Having cleared the centre, go down each side; and, for cases where there is any considerable lateral growth of adenoids, the curettes with lateral edges, right or left, may be useful. When you have removed the growth with a few firm strokes, turn the child at once on his side, keeping the gag still in, and with your finger, carefully cleansed, feel for any unremoved remnants of the growth and remove them; then squeeze the blood out of the nostrils, and take out the gag. I do not use any after-

treatment, beyond keeping the child indoors for a few days. He is not likely to have pain or difficulty of swallowing, because his food does not touch the raw surface. But he may be seriously upset by the operation, faint and miserable, and may need careful nursing for twenty-four hours or longer. The good results of the operation are most evident and come quickest in very small children; with those who are older, the habit of mouth-breathing may take a long time to correct. It is a good plan, in most cases, to politzerize the patient a few days after the operation.

Recurrence of adenoids after operation is a common event; and, if it be the fault of the surgeon, it is at all events to be noted that these cases of recurrent adenoids come from many different hospitals. Still, recurrence is probably a sign that the operation was in most of these cases not done thoroughly. In most of them, but not in all; for instance, I have had a case where three operations had already been performed at other hospitals, yet the naso-pharynx was now again obstructed. And among my own cases the growth recurred in some instances where I believe the operation was done thoroughly, and gave great relief at the time. It is a common question at the time of operation: 'Will the adenoids come back again?' and we cannot say positively that they will not.

Where adenoids and enlarged tonsils are present together, I generally remove them at one operation, taking the tonsils first; and no harm has come of this method; but with weakly or very young children I generally remove the tonsils first, and the adenoids some days later. Before the discovery of adenoids, the removal of enlarged tonsils was by some surgeons condemned as bad surgery; because they left the adenoids behind, and the nasal obstruction remained unaltered. Then came a

protest that it was useless to remove enlarged tonsils—they were important structures; they had some mysterious sympathy with the generative organs; the removal of them was dangerous and irrational.

There are one or two practical matters to be noted about the removal of enlarged tonsils. If they are not globular, but somewhat flattened and irregular in outline, you may get them to stand out better by going round them with a blunt instrument, so as to free them from the pillars of the fauces. Make sure that your tonsillotome is the right size, so that the tonsil, pressed inward, comes well into the ring, and fits it. You are likely to use one that is too large, rather than too small; and it is a good plan to measure the tonsil before you remove it; assure the patient that you are 'not going to do anything,' and he will let you try one instrument after another, to see which ring best suits the tonsil. Use a tonsillotome, not the old-fashioned guillotine; but there is no need for the fork that is added to some of the tonsillotomes; you want a strong, simple instrument, and the fork is only in the way. See that your tonsillotome is absolutely clean, sharp, and working smoothly; get it flat against the side of the pharynx, not sloped inward towards the middle line; and drive the blade home hard. If a shred of tissue remains undivided, put your finger down along the instrument, break the shred, and remove the tonsil before you draw back the blade. I have never had any trouble from hæmorrhage. If you have only just scraped the top off the tonsil, the rest of it will not shrink; and it is better to leave enlarged tonsils alone than to 'have a go at them,' and fail to remove them properly.

NOTE.

I DID not submit these essays to criticism till they were finally printed. Happily for the reader, I can correct here some omissions that Mr. Ballance has noted in this last essay:

1. We must distinguish exostosis—a single growth from the posterior wall of the meatus, at the junction of its cartilage and bone—from hyperostosis—a multiple nodular thickening of the bony meatus.
2. In young children there may be acute suppuration of the middle ear, even septic phlebitis of the lateral sinus, without either redness or bulging of the membrana tympani: yet paracentesis will let out pus, and may save the child's life.
3. In cases of tinnitus, it is a favourable sign if the noise be intermittent; and unfavourable, if it be constant.
4. Adenoids do occur even in infants, 'congenital adenoids,' and may then cause severe dyspnœa, endangering life. Probably some cases of 'laryngismus stridulus' are really adenoids. These infants must be treated by nasal intubation and operation. And on the whole subject of operation for adenoids, perhaps I have not enough emphasized the necessity for deliberate and complete removal of the growth; especially in those cases where it is lateral, not median, causing aural disease, not nasal obstruction.

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